STUDY OF PREVALENCE OF ANAEMIA IN PREGNANT WOMEN IN BUNDELKHAND REGION

THESIS

Submitted to

Faculty of Home Science

Bundelkhand University, Jhansi

For

The Degree of

Doctor of Philosophy

Home Science

(Food & Nutrition)

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CERTIFICATE-1

This is to certify that the thesis entitled. **"STUDY OF PREVALENCE OF ANEMIA IN PREGNANT WOMEN IN BUNDELKHAND REGION"** Submitted to the Bundelkhand University, Jhansi (U.P.) India for the award of the degree of **DOCTOR OF PHILOSOPHY** in Home science (Food and Nutrition) is a record of bonafide research work carried out by ***PRATIBHA ARYA***, under my guidance and supervision.

The work embodied in this thesis or a part were of has not been submitted for the award of any other degree or diploma.

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DECLARATION

I hereby avow that the work presented in this thesis **"Study of Prevalence of anemia in pregnant women in Bundelkhand Region."** is entirely my own work and there are no collaborators. It does not contain any work for which any other University has awarded degree/diploma .

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ACKNOWLEDGEMENTS

I feel greatly privileged in offering my heartiest thanks and expressing my deepest sense of gratitude and profound respects to my Major Advisor Dr. Neelma Kunwar, Associate Professor and Head, Department of Extension Education College of Home Science, Chandra Shekhar Azad University of Agriculture, & Technology Kanpur, for her valuable guidance, constant encouragement, stimulating advice constructive and fruitful suggestions and above all significant contribution made by her throughout my research work of Ph.D. without which this work would not have taken the present form. She always instilled in me a spirit of confidence and independent thinking and evaluation in the course of this investigation and preparation of the manuscript. I have all praise for her and will always go on holding her in high esteem even throughout my educational career.

I don't have any appropriate words to express my heartiest thanks and gratitude to Dr. Meenakshi Singh, Lecturer and Head, Institute of Home Science, in Bundelkhand University for the love, inspiration and moral support throughout my research period.

From the Depth of my heart I have to say heartiest thanks to my husband Er. Yashpal Singh for his encouragement, moral and emotional supports during my thesis work.

I deeply acknowledge the ever-ready help, constant encouragement, moral support and affection extended by my parents

throughout the course of my study. I do not find any appropriate words to express my deep gratitude for them. They always had kind enough in providing me all the facilities even beyond their reach for carrying out the present study properly and smoothly.

I also extend my heartiest thanks to Dr. Sultan Singh, Senior Scientist, for the ever-ready help and constant encouragement

I would like to express my deep heartful thanks to my children Devshree, Shauryan and Pinky for providing me mental support at each and every moments.

I shall be failing in my duty if I do not express my sincere thanks to all my friends- Preeti, Meghna, Damayanti, Richa, Kumkum involved in this work especially who had always been inspiring me through their valuable and constructive comments, sincere advice and moral encouragement throughout this investigation. I have to express my special thanks to Anjali Saxena, for continuous help in statistical work, for their valuable moral, emotional and cordial support to achieve this goal and Mrs. Sadhana for helping in typing the thesis.

Pratibha Arya

(PRATIBHA ARYA)

Dedicated

to

"My Family"

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INTRODUCTION

W.H.O. has defined Anemia as **"A condition in which the hemoglobin content of blood is lower than normal as a result of a deficiency of one or more essential nutrients, regardless of the cause of such deficiency".** Anemia is condition of low circulating hemoglobin (Hb) in which the Hb concentration has fallen below a threshold level at two standard deviations below 15-20 percent of pregnant women have Anemic Women who have had repeated pregnancies and young girls who are still maturing are most likely to become anemic and to bear infants who have low iron reserve. Mostly anemia is the result of iron deficiency. The anemia should be different from the lower hemoglobin and heamatocrit level that result from the increase in the blood volume the so-called 'physiologic anemia of pregnancy. The Indian council of medical research (ICMR) uses four categories of Anemia depending upon the hemoglobin levels. Some authors use Hb levels of 9-11 gm/dl in mild Anemia.

Category	Anemia Severity	Hb levels (gm/dl)
I	Mild	10.0 - 10.9
II	Moderate	7.0 - 10.0
III	Severe	< 7.0
IV	Very Severe	< 4.0

Anemia can be aggravated by environmental factor, which lead to blood loss e.g. Hook warm Infestation . Anemia is a major problem of immense public health significance affecting person of all ages & economic group in India as well as abroad. Nutritional Anemia is a pathological condition in which O_2 carrying capacity of blood reflected by hemoglobin & hematocrit level become abnormally low because low essential nutrient regardless of cause of these deficiencies. In developing countries like ours, beside deficiency, at food specific nutrient like, iron, folic acid Biz, deficiency protein, vitamin C, Vitamin E, trace element etc. Anemia is a condition in which these is diminished O_2 carrying capacity of the blood as a results of reduction in total circulating hemoglobin as reduction in RBC. The anemic person is who contain below 12 gm/100ml. In adult non-pregnant women and ANO contain below 13gm/100ml in adult male.

In other world "Anemia a condition in which a deficiency in the size of number of erythrocytes or the amount of hemoglobin they contain limits the exchange of oxygen and carbon dioxide between the blood and the tissue cell." In Iodine Anemia I, the most common nutritional problem & its affect more than half of total population particularly in children where the incidence is 60-97%. Symptoms of anemia vary depending on the severity of the condition. Anemia may

occur without symptoms and be detected only during a medical examination that includes a blood test. Symptoms may include the following:

- Weakness and fatigue are the most common symptoms of even mild anemia. (Even iron deficiency with out anemia can reduce working capacity in some people.)
- Shortness of breath on exertion.
- Rapid heartbeat
- Lightheadedness or dizziness.
- Headache.
- Ringing in the ears (tinnitus).
- Irritability and other mood disturbances.
- Pale skin (however, healthy-looking skin color does not rule out anemia if a patient has risk factors and other symptoms anemia).
- Restless leg syndrome (RLS) and other sleep disturbances. In a 2003 study, multiple blood donations and iron deficiency was

associated with restless legs syndrome in adolescents who did not show sings of anemia.

- Mental confusion.
- Loss of sexual drive. *(Haevey Simon)*

Recent World Health Organization (WHO) statistics indicate a worldwide Anemia prevalence of about 30% with higher rates in developing countries. Anemia is also prevalent in non-pregnant women (35%) and among adult males (18 percent). In Asia 65 percent of the pregnant women are anemic compared to 14 percent in Europe. In India its incidence varies from 80 percent in Hyderabad and 45 percent in Madras. 85 percent of pre school children have Anemia (Nutrition on News 1982 National Institute of Nutrition Hyderabad). In 1998 the World Health Organization reported a prevalence of anemia within the children and pregnant women about 50% in the developing countries, making it one of the important public health problems. The groups at greatest risk of anemia are pregnant women, infants, puberty children and women of childbearing age.

The overall prevalence of Anemia is estimated to be about 40% of the world's population. The prevalence is 35% for non pregnant women globally and tends to be 3-4 times higher in non industrialized

than in industrialized countries is the prevalence of Anemia in prevalence globally and in south East Asian countries. The prevalence is very high in central Asia also. As shown by demographic and health surveys in Kazakhstan and Uzbekistan where the incidence was 80% Nearly half of the global total number of anemic women live in the Indian alone subcontinent and in India. The prevalence of Anemia during pregnancy may be as high as 88%. In Indian anemia antedates pregnancy is aggravated by increased requirement during pregnancy and blood loss at delivery infections in the Antenatal and postnatal periods. The relative prevalence of mild, moderate and severe anemia are 13%, 5-7% and 12% respectively. .

Anemia is the commonest medical disorder in pregnancy and had a varied prevalence, etiology and degree of severity in different populations. Nutritional anemia may be defined as the condition that results from the inability of the erythropoietic tissue to maintain a normal hemoglobin concentration on account of inadequate supply of one or more nutrients leading to reduction in the total circulating hemoglobin. Nutritional Anemia is caused by the absence of any dietary essential that is involved in hemoglobin formation or by poor absorption of these dietary essentials. Some anemia are caused by a lack of either dietary iron or high quality protein by lack of pyridoxine

(vitB6) which catalyses the synthesis of the haem protein of the hemoglobin molecule, by the lack of vitamin C which influences the rate of iron from transfer in to the tissues or by a lack of vitamin E which affects the stability of the red blood cell membrane, Copper in not part of the hemoglobin molecule but acids in its synthesis by influencing the absorption of iron its release from the liver or its incorporation in to hemoglobin molecule.

The iron needs of pregnant women increase substantially beginning in the second trimester of pregnancy and reach their peak during the third trimester. Thus, a low intake and absorption of iron do not satisfy the iron requirements in pregnancy anemia are very widespread. More among females than males and higher among Infants and children than adults severe anemia (with hemoglobin levels< 8gm/dl) is more frequently seen in severely undernourished children who also exhibit signs associated with deficiencies of calories, proteins, vitamins and minerals. Iron deficiency anemia occurs when the body lacks iron to produce the hemoglobin it needs to make red blood cells. It can be caused by a number of conditions. Iron – poor Diets. Lack of iron in the diet is not a common cause of iron deficiency anemia. In fact, most Americans may be consuming too much iron in their diet. Most of the iron in red blood cells is

recycled and reused. In general, most people need just 1 mg and menstruating women need 2mg of extra iron each day, which a healthy diet easily provides. Iron –poor diets are only a cause of anemia in people with existing risks for iron deficiency.

Pregnancy consists of two fundamental and interdependent anabolic processes: (1) maternal physiologic and metabolic adaptations and (2) growth and maturation of the fetus and placenta. The conceptus is entirely dependent upon the mother for nutrients, and the maternal adaptations, which involve most organs, are induced by the conceptus. Because pregnancy consists of the accretion of mass in the form of increased maternal red blood cells, plasma and interstitial fluid volumes, increased weight of the uterus, breasts, fetus, placenta and amniotic fluid, it is presumed that a constant supply of nutrients and calories is required to support growth. Human fetal or neonatal death or damage resulting from severe calorie and protein deficits is demonstrable from clinical experience The impact of lesser degrees of nutritional deficit on fetal health is more difficult to identify because of the ability of the mother to provide nutrients from catabolism of her own tissues and the ability of the placenta to adapt functionally to an adverse environment.

Successful outcome to the pregnancy may also be determined by the prepregnant nutritional condition of the mother. The average women in the United States gains about 11 kg during pregnancy. Although considerable variation may be observed, maternal weight is usually added by increments of 1 to 1.5 kg in the first trimester, 4to 5kg from 14 to 27 weeks and 5 kg during the last 13weeks. The approximate mean weights of known components are: fetus 3,400gm, placenta 650 gm, amniotic fluid 800 gm, uterus 1,000 gm, breasts 400 gm, maternal blood 1,250 gm, maternal interstitial fluid 1,500 gm, for a total of 9kg. Calculations for the extra calories required for the assembly and maintenance of the conception and the maternal anatomic and physiologic adaptations to pregnancy amount to 27,000 to 31,000 kcal for the whole pregnancy. These caloric needs are lowest during the first 20 weeks – approximately 60 to70 kcal per day and rise to 220 to 230 kcal per day at term.

Pregnancy demands an increased supply of iron for hemoglobin synthesis because of 30 per cent increase in the total number of maternal red blood cells, quiring 500 mg of iron, and the needs of the fetus and placenta, requiring an additional 300mg there are two primary sources from which to meet these needs: body stores and dietary ingestion. Iron stores may be depleted prior to pregnancy

and, consequently this resource may be limited. Absorption of iron form the intestine appears to be enhanced in the latter two thirds of the pregnancy. The health problems of pregnant adolescents and their newborns have received considerable attention in recent years. The possible roles which maternal nutrition may play in the causes and effects of these problems are being investigated. King et al. assessed the nutritional status of a small group of poor and pregnant teenagers; using intake measurements, they found considerable deficiencies in calcium, iron, vitamin A and calorie. .

Many difficulties are associated with the nutritional evaluation of adolescent patients. For example, concern is expressed that the early adolescent growth spurt might be competitive with pregnancy for the available nutritional resources. It is probable, however that even the youngest pregnant women (under 16) achieve most, if not all, of their growth prior to the conception.

Effort invested in nutritional assessment and counseling of these very young pregnant women may pay big dividends over the years, being profitable not only for the immediate pregnancy but for the child as it develops and for the mother in subsequent gestations. In a recent study it was found that young pregnant patients of one

ethnic group had very little accurate information concerning foods and nutrition. In rural India, where about 40 per cent of population lives below poverty line in conditions of unacceptable deprivation, squalor and misery/inadequate nutrition continues to be a major problem. Nutritionally vulnerable groups of populations, especially the expectant mothers, are most affected. Major factors contributing to the state of inadequate nutrition include maldistribution of essential food commodities, low purchasing power, lack or knowledge about balanced nutrition cultural practices and taboos, large family size and limited access to health care facilities.

The critical and unique place that pregnancy occupies in the chain of life has health and social importance for individuals, families and society as a whole. In the social set up of our country specially in that of rural origin, women are nutritionally the most deprived section. Strong gender biases have been found to exist in the food distributing within the family. Women face not only a relative food deprivation but also an absolute vis-à-vis their energy expenditure. In this segment of women, the expectant mothers appear to be more vulnerable to malnutrition beside the fact that reproduction in all races of women involves considerable physiological stress as pregnancy

characterized by profound physical metabolic and hormonal changes which calls for additional nutritional demands on their bodies.

Women owing to the physiological needs of pregnancy are particularly vulnerable to nutritional problems during this period as manifested in higher mortality rates (4 to 5 per thousand live births) and poor nutritional status About 20 percent of premature birth and 15 pregnant of maternal fatalities are due to prenatal malnutrition. Maternal malnutrition presents an additional risk to the developing fetus with far reaching effects on succeeding generation leading to high infant mortality rates, low birth weight babies, permanent brain damage and even congenital defects. Closely spaced pregnancies, severe anemia and heavy physical work during pregnancy are also the contributing factors to above.

For most women, nutrient needs during pregnancy and lactation are higher than at any other time in their adult life and are greater for certain nutrients than for others. Notice that although nutrient needs are much higher than usual, energy needs are not. An increase of only 15 percent of maintenance calories is recommended to support the metabolic demands of pregnancy and fetal development. Dietary supplements should not replace dietary

counseling or a well-balanced diet; improvement of diet quality through use of nutritious food is preferred to supplementation.

Thirty years ago, we reported a high frequency of nutritional anemia among pregnant women of low socioeconomic class, from Zulia State, Venezuela. Today,, preliminary results, show an increase of anemia from 20% in the year of 1972 to 44% at the end of the first trimester of gestation, and from 53% to 63% at the end of the third trimester. These results could be the reflection of the impairment of the economic conditions in the country and the failure of the prenatal care services in preventing or treating anemia in pregnancy. *(Diez-Ewald M.)*

Anemia is one of the most common risk factors in the area of obstetrics and prenatal medicine. During pregnancy and in the puerperium it is associated with an increased incidence of both maternal and fetal morbidity and mortality, the extent of which is dependent upon the severity of anemia and the resulting complications. In order to correctly diagnose the type and degree of anemia, a prerequisite for selection of the proper therapy. One must first of all correctly differentiate between the relative, i. e., the physiological anemia of pregnancy due to the normal plasma volume

increase during pregnancy and "real anemia's" with various different path physiological causes. When defining the Hb cutoff value for anemia in pregnancy, the extent of the plasma volume changes with respect to the gestational age must be taken into consideration. It has been found that hemoglobin values < 11.0 g/dl in the first and third trimesters, and < 10.5 g/dl in the second trimester may point to an anemic situation which should be further clarified. The first important steps for diagnosing anemia in a pregnant patient include a thorough check of her medical history and a medical examination. This procedure often lays the basis for a correct diagnosis. The current gold standard to detect iron deficiency remains the serum ferritin value. To be reliable, this requires the ruling out of an infection (chronic or acute) as a cause of the anemia. We recommend a complete laboratory test for the exact hematological status as well as the assessment of specific chemical laboratory parameters. These should include a palette of additional, promising new parameters such as hypo chromic red cells and transferrin receptors, which allow more accurate detection of iron deficiency and differential diagnosis of iron deficiency anemia. After correct diagnosis. Major emphasis should be put on safe and effective treatment of anemia, which again depends on severity of anemia, time for restoration and patient's

characteristics. Today effective alternatives to oral iron only or blood transfusion such as parenteral iron sucrose complex and in selected cases also recombinant erythopoietin have been investigated and show promising results concerning effective treatment of anemia during pregnancy and postpartum. *(Brevmann C.)*.

To meet the increased need for iron during the second and third trimesters of pregnancy, a low-dose iron supplement (30miligrams of ferrous iron daily) is advised. If therapeutic levels of iron (more than 30 milligrams daily) are given to treat anemia, supplementation with 15 milligrams of zinc and 2 milligrams of copper is recommended because the iron may interfere with the absorption and utilization of these trace elements. With careful planning pregnant women can meet the physiologic requirements for folate form diet; it is prudent to supplement the diet with low doses (300 micrograms a day) of folate if there is any question about the adequacy of intake of this nutrient. All the available information indicates increasing iron intake in the population can prevent that anemia. Two approaches are used to achieve, 1st is Therapeutic supplementation of iron and folate tablet. And 2nd is fortification of a dietary item with iron.

Because of accumulating data that excessive vitamin A consumption poses a risk of birth defects, supplementation with preformed vitamin A should be avoided during the first trimester unless there is specific evidence of a deficiency. Beta-carotene intake need not be restricted. For pregnant women who do not ordinarily consume a high-risk adequate diet and for those in categories, such as women carrying more than one fetus, heavy cigarette smokers, and alcohol and other drug abusers, a multivitamin-mineral supplement is recommended. The supplement should be taken between meals or at bed time to facilitate absorption and should contain: 0mg iron, 15 mg zinc, 2 mg copper, 250 mg calcium, 2 mg vitamin B6, 50 mg vitamin C.

A 10-microgram (400 IU supplement of vitamin D is recommended for vegans and others with low intake of vitamin D-fortified milk. A vitamin B12 supplement of 2 micrograms daily is recommended for vegans. A calcium supplement of 600 milligrams daily is recommended for women under age 25 whose daily dietary calcium in takes than 600 milligrams. To enhance absorption and limit interaction with iron supplements, the calcium should be taken with meals.

Expectant mothers are the worst sufferers of malnutrition among the vulnerable groups. The morbidity and mortality rates among this group are high. Deficiency disease such as anemia, night blindness, oedema & angular stomatitis are very common in this group high incidence of prematurity, low birth weight of babies& the consequent high neonated mortality are mainly attributed to maternal malnutrition.

In developing countries, the health and nutrition of females throughout their entire life is affected by complex and highly interrelated biological, social cultural, and health service-related factors. Rather than focusing exclusively on the prenatal period, we describe a life cycle approach to improving maternal, nutrition which goes beyond the traditional provision of nutrition services during pregnancy, by addressing risk factors that are present well before pregnancy, even before childbearing age. This approach involves specific policy initiatives and a "minimum package" program that is targeted at females. Policy actions and the components for effective implementation of the program are described. The prospects and challenges to be overcome-which include translating scientific knowledge into action, removing conceptual and implementational constraints, identifying biologically meaningful indicators for problem

identification, and improving understanding of physiologic and social adaptation mechanisms are discussed, as are persistent problems with health care delivery system. *(Jose o mora and Penelope S Nestel)*

Anemia is an important nutritional problem affecting all legment of the population in general & children, women & pregnant women in particular. In the latter groups prevalence of anemia may be as high as 60-70%. Anemia in our country is essentially due to iron deficiency. Although the children & pregnant women to folate deficiency also play a part our diet contains a fairly good amount of iron.

Iron deficiency is the most common cause of Anemia. This may occur as a result of the factor for affecting anemia. Iron deficiency anemia is a problem of serious public health significance given its impact or psychological and physical development behavior & work performance. It is the most prevalent nutritional problem is world today affecting more than 700 million persons. Simply started iron deficiency occurs when an insufficiency amount of iron is observed to met the body's requirement. The insufficiency may be due to the inadequate iron intake to reduce the bioavailability of

dietary iron to increase need function, as to chronic blood loss when prolonged iron deficiency lead to iron deficiency anemia.

In clinical practice, nutritional anemia's commonly associated with over all under nutrition & balance diet should be given. Usually diet alone is not adequate & therapy with specific supplementation particularly diet mainly vegetarian on with malabsorption vitamin B_{12} deficiency.

A nursing mother with such an anemia secretes little vitamin B_{12} in the milk & so her breast –feeding infant may also become deficient

A Public health programme of distribution of iron folate tablet to pregnant women. (during last trimester) and preschool children are in operation of a part of MCH service. This approach is designed to achieve result in limited time. Like in pregnancy, there are however contain problem in making the programme effective and have an impact on the problem of anemia.

An alternate productive approach is to improve iron balance in the entire population through fortification of a commonly consumed dietary item with iron. Toward this end of technology for fortifying salt with iron have been developed in India by "NATIONAL INSTITUTE

OF NUTRITION" on its effective in reducing anemia when demonstrated in pilot trials.

Anemia may antedate conception. It is often aggravated by pregnancy & the accidents of labor may perpetuate it. It is of the prime concern of antenatal care to forestall for the salty of labor & the puerperal state, to say nothing of future health In round figure the pregnancy demand for iron come to a total of about 900mg of which about 500 to 600 mg to uterus and its content. Some where between 500 to 600 mg. are accounted for in an average blood loss at delivery a similar amount is excreted in the lactation. on top of this there is an increased maternal hemoglobin mass about 500 mg.The iron of which is returned to store after delivery on the credit side who ever there is an over average having about 225 mg. as result of ammonerhea through out the pregnancy total iron defect 600 to 700mg. it will be seen there fore that time is required for a responsible diet to make good the iron overdraft of pregnancy and consequently if pregnancy succeed each other rapidly the patient is unlikely to "get out of the red".

Just now common iron deficiency is amongst the women is descriptive iron deficiency anemia was present in over and% of

causes but latent deficiency without anemia was found in at least 3 time of many female population of all ages 19,26,27 these figure were obtained in women who were not pregnant but severe to know that a large population store there pregnancies short of iron the term "latent iron deficiency".

The commonest sources of trouble in anemic pregnancy is the adequate absorption of iron the formal daily requirement for the gravid women is about 20mg. of iron ever in the cases which the iron store have not suffered depletion prior to pregnancy make heavy demand upon maternal iron and the average fetal requirements amount to about 375mg. Unfortunately margin between the patient requirement and the quantity of iron normally available regianable good diet in a very narrow one infects the average diet seldom contain more than about 15mg. a day. Of the total amount of iron in food. only a fraction (about 10%) is available for absorption, natural food such as liver, meat, peas, egg & certain diet fruit.

For ex-apricots are good source of iron phytic acid prevent in brown bread which also contain iron to from insoluble salts. The presence of calcium in diet, however tends to divert some of the phytic acid effect. Iron deficiency Anemia in the commonest type of

depending upon the social grades of patients may be found in up to nearly a quarter of all pregnancies.

Multiparty, previous menorrhagia of sub nutrition favours its origin. It may be due to dietary insufficiency or to interference with iron absorption. The importance of chronic infection in the etiology of iron deficiency anemia must not be overlooked & its is particularly true of chronic & apparently latent pyelonephritis. In fact a urinary infection may be prevent as a case of apparently refractory anemia.

In iron deficiency anemia the blood picture shows both a low hemoglobin & a reduced packed cell volume, the colour index is less than unity & the MCV and MCH are both reduce in other word the picture is characteristically microcytic & hypo chromic. New cell are being generated at normal rate & the reticulocyte count show little divination from normal. The cell being smaller than usual is of unequal size & staining. There is no undue haemolysis & the serum billirubin is not increased. The bone morrow in normoblastic in character.

The symptom are often not very pronounced, but when present consist of fatigue, dyspnea, palpitations, loss of appetite & digestive upset & the patient usually demonstrate tallor of the mucus

membrane & in severe cases, a considerable degree of oedema, mainly of the lower extremities.

The treatment consists in making good the iron, which the patient lakes & the method will depend upon the time available before delivery. Provided one has at least 10-week grace and anemia is not severe. A satisfactory result can be obtained by oral medication & there are many satisfactory preparations and preparation ferrous salts now available. Ferrous sulphate (0.2 g tablet) is the cheapest of these & if suitable for most patient but the more expensive ferrous qluconate fumarate & succinate may produce less epigastric discomfort nausea, vomiting & constipation in the minority who cannot tolerate ferrous sulphate most symptom of intolerance to iron are more related to the dose of elemental iron itself than the actual preparation and therefore the daily dose of ferrous sulphate for example should not exceed three two hundred mg tablet taken during or after a meal increasing the doses does not improved the hematological response and adverse. Side effect may well demand reduction. One of the commonest trouble is that the patient is not taking her iron and the easiest way to find out is to inquire of her about the colour of her stool if she report that they are normal instead of black one can be certain that she is not infect taking her iron table.

Iron sorbitol contains 50mg of elemental iron/ ml. It is supplied in ampoules of 2ml the recommended dose is 1.5kg. of iron per kg of body weight giving daily of on alternate days. So an adult weighing approximately 70kg would receive on ampoule (100mg of iron) in a single dose it is about 200mg of iron in the women to raise the haemoglobin value by 1gm/100,l of blood or 350mg or iron to raise the haemoglobin level by 100% in rough figure.

The gestation period is a rapid growth period. Growth of the fetus and other developments that take place to facilitate its maintenance throughout pregnancy and delivery of the child involve an increase in the nutritional requirements of the pregnant woman. The fertilized ovum attaches itself to the uterine wall and with help of the placenta, enables the developing fetus to respire, acquire nourishment and eliminate wastes. Exchange of nutrients and wastes take place in the placenta much as they do in the gastro-intestinal tract; oxygen and nutrients pass from the mother to the fetus; carbon dioxide and metabolic wastes pass the opposite direction. Water and the fat-soluble vitamins diffuse to the fetal circulation. Other nutrients such as amino acids, glucose, the water – soluble vitamins and minerals such as calcium, sodium and iron are actively transported.

An exception to the passage of nutrients is the protein molecule. These do not cross the placenta, as they are too large to penetrate the cells of the placental villi. The exception to this phenomenon is a specific maternal antibody, which is structurally able to penetrate, and which provides the fetus with invaluable immuno-resistance to infections that lasts for six months or more after birth.

So, the increase in the nutritional requirements of a pregnant woman can be attributed to:

- Rapid growth of the fetus
- Development of the placenta
- Enlargement of maternal tissues namely the breast and uterine tissues
- Increase in maternal circulating blood volume
- Formation of amniotic fluid
- Storage reserves
- Mineralization of the skeletal and bone structure of the fetus as well as tooth buds

During the first half of the 20th century, chronic energy under nutrition due to low dietary intake, repeated infections, and rapid succession of pregnancy were the factors most responsible for maternal under nutrition and consequent adverse outcomes of pregnancy. Efforts to improve dietary intake, treatment of infections, and provision of contraceptive care were the major focuses of intervention from 1950 to 1990. These interventions resulted in reduction in severe grades of undernutriton and anemia during pregnancy and there was no moderate degree of undernutriton. However, there was no reduction in mild and significant improvement in the course and outcome of pregnancy, or in birth weight. During the 1990s, among the middle-and upper-income groups, there has been a progressive rise in obesity and consequent adverse effects. The advent of HIV infection in India in the 1980s will inevitably lead to increases in severe under nutrition associated with HIV infection in pregnancy and an adverse impact of maternal HIV infection on the fetus. Practicing physicians and nutritionists in the new millennium will there fore have to assess each person individually and provide appropriate advice regarding diet, exercise, fertility, and infection prevention and control in order to achieve optimum health and

nutrition status during pregnancy and to prevent adverse pregnancy outcomes.

Nutrition at optimal levels is fundamental in the maintenance of positive health. Maternal nutrition is very important for the course and outcome of pregnancy. Lactation represents a stage wherein health and nutritional status of the infant are dependent on the mother. Successful pregnancy and lactation require adjustments in maternal body composition, metabolism and function of various physiological systems. A diet that meets maternal nutritional needs is required for these adjustments, so that maternal well-being is safeguarded with birth of an healthy infant. Adequate nutrition supports the growth of both maternal and fetal tissues. Chronic under nutrition throughout pregnancy affects birth weights of newborns. Poor nutrition causes intra-uterine growth retardation. Specific nutrients like zinc, iodine and folate are also required for development of the fetus. Fetal iron deficiency exists in maternal iron deficiency anemia. Maternal nutritional status, breast milk composition and volume are elaborated in the article. Proteins, fats, minerals and vitamins and their requirements are narrated in detail. Additional nutritional requirements during lactation have been tabulated in this article. Thus improving the nutrition and health of girls and younger women and of

mothers during pregnancy and lactation will derive benefits in terms of improved health of their children throughout their lives.

World Heath organization (WHO) statistics indicate a world wide anemia prevalence of about 30% with higher rates in developing counties young children and pregnant women are the most affected group with an estimated global. Prevalence of about 40% and 50% respectively. Anemia is also prevalent in nonpregnant women 35% and adult males at the tune of 35% and 18% respectively.

In Asia 65% of the pregnant women are anemic compared to 14% in Europe. In India its incidence varies form 80% in Delhi to 60% in Hyderabad and 45% in Madras 85% of pre-school children have anemia (Nutrition News 1982, National Institute of Nutrition, Hyderabad). Anemia is very widespread, more among females than males and higher among infants and children than adults. Severe anemia (with Haemoglobin level <8g/dl) is more frequently seen in severely undernourished children who also exhibit signs associated with deficiencies of other nutrients viz. energy proteins, vitamins and minerals.

According to National Institute of Nutrition (1991) anemia is most common in all the group of adolescent girls to the tune of 20-

25% irrespective of the social class. A healthy mother is expected to give birth to healthy and normal child. further more, children born to malnourished mothers remain at a high risk of developing malnutrition thus, by improving health status of pregnant women, a corresponding, improvement in the health of future new borns can well be expected.

Numerous factors interact to determine the progress and outcome of pregnancy. Although much remains to be learned about the role of nutrition in modifying this process. It is well accepted that the nutritional status of the pregnant women affects the outcome of her pregnancy.

This is especially true with respect to the birth weight of her infant, a factor closely related to infant mortality, and the infant's risk of long-term adverse health outcomes, such as hypertension, obesity, glucose intolerance, and cardiovascular disease.

Many Physical and biochemical changes occur in normal pregnancy. Blood volume expands by 50% resulting in a decrease in haemoglobin levels, blood glucose values and serum level of albumin, other serum protein and water-soluble vitamins. The decline in serum albumin levels contributes to a tendency for extra cellular

water to accumulate during pregnancy. The decrease in water-soluble vitamin concentration takes determination of an inadequate intake or a deficient nutrient state difficult. By contrast, serum concentration of fat-soluble vitamins and other lipid fractions, such as triglycerides, cholesterol. and free fatty acids, increases.

A marked increase in the maternal blood supply during pregnancy greatly increases the demands for iron. Availability of minerals either from diet or as supplements cause increase in erythrocyte volume by 20-30% Active bone marrow may utilize an extra 500 mg of elemental iron during pregnancy and the term fetus and placenta accumulate 250 to 300 mg of elemental iron overall, the pregnant women must have between 700 and 800 mg of extra iron, most of which is needed during the last half of pregnancy, when the heaviest maternal and fetal demands occur.

Anemia means decrease in oxygen carrying capacity of blood as a result of significant reduction in red blood cell (RBCs). Decrease in red call concentration in peripheral blood or decrease of hemoglobin is the main indicator of anemia. Decrease in hemoglobin concentration by more than 10% below the average values signifies

anemia. Anemia is caused by one or a combination of more than one of the following factors.

Dietary deficiency of iron, vitamin B_{12} and folic acid. Increased demand of the above nutrients due to growth in children, pregnancy, lactation and menstrual bleeding in women, bleeding disorders of gastrointestinal tract, worm injectation and surgical procedures.

Dietary components, such as iron, vitamin B_{12}, folic acid, trace elements, protein and vitamin C and B complex are essential for the Production of RBCs.

The average adult male had about 14.8gm Hb/100ml of blood. It is about 13.4gm Hb/ 100 ml of blood in adult females.

Objective :

1. To find out the extent of pregnancy anemic prevalence in rural vis-a vis urban population.
2. To investigate the socio personal, socio economic and dietary factors associated with prevalence of anemia.
3. To suggest the suitable/ appropriate remedies for controlling pregnancy anemia.

Chapter - 2

Review of Literature

REVIEW OF THE LITERATURE

***Pathak et al* (2003)** assessed the prevalence of iron, vitamin A and iodine deficiencies amongst rural. Adolescent pregnant Mothers (APM). Anemia was assessed by hemoglobin estimation with the help of the Hemocue instrument and vitamin. A deficiency (VAD) was assessed by presence of night blindness utilizing a pre-tested semi structured performa Iodine Deficiency was assessed by the clinical examination of the thyroid gland and estimating the urinary Iodine excretion (UTE) levels of each subject. Nutrition intake was assessed by the 24-hour dietary recall method. It was found that 46% of A PM was anemic (Hb<11. 0gm/dl). Sixteen percent of the study subject had presence of night blindness. Fifteen percent of the subjects had Goiter. Median UTE level in the subjects studied was 95.0 micrograms / l. concomitant prevalence of the three deficiencies was amongst 2.0% of the population. The 24-hour dietary intake revealed that the mean consumption of retinal and iron was only 13 and 28% of the recommended dietary allowance, respectively.

***Sharma et al* (2003)** studied the effect of various dietary habits, such as a vegetarian diet or various types of meat on the prevalence of anemia in pregnant women result that most women were in the

second (26%) or third trimester (63.2%) of pregnancy. Prevalence of anemia was found to be very high of 1150 women 96% were anemic (89.8%mildly anemic, 5.3% severely anemic). Anemia was seen in 96.18% cases in vegetarian women 95.3% in halal meat eaters, and 96.2% in Jhatka meat eaters (not significant). Although the percentage of women with <11g/dl Hb was less in the Jhatka group eating meat more than 5 times per month, than in halal meat eaters and vegetarians, the difference was not statistically significant.

***Anderson et. al* (2003)** studied pregnant women's diet at food & nutrient levels and how these match recommendations, to describe how factors such as education level, economy and folk dietetics influence the women's food choice, and to give suggestions for the improvement of nutrition education in the existing antenatal care system results indicated that the women's diet (without supplements) was insufficient in energy and all nutrition except fat, compared with the Indian recommendation. Aggravating low intakes of micronutrients were found which were reflected in low intake of foods other than rice. Eating customs and economy appeared to influence the women's food choice negatively in relation to recommendations while factors such as education level, family type, pregnancy number and folk dietetics did not seem to have a negative effect.

***Bentley et al* (2003)** investigates the prevalence and determinants of anemia among women in Andhra Pradesh and examined differences in anemia related to social class urban/ rural location and nutrition status body mass index (BMI). Prevalence of anemia was high among all women. In all 32.4% of women has mild (100-109.99g/l for pregnant women, 100-119.99 for non pregnant women). 14.19% had moderate (70-99.99g/1), and 2.2% had severe anemia (<70g/1). Poor urban women had the highest rates and odds of being anemic. Fifty two % of thin, 50% of normal BMI and 41% of overweight women were anemic.

Xiong et. al (2003) revealed that to study. The prevalence of anemia was 10.3% at the first trimester, 18.9% at the third trimester. Overall, 26.2% pregnant women experienced anemia in pregnancy. Anemia during early pregnancy was not associated with increased risk of adverse perinatal outcomes. However, anemia in later pregnancy was inversely associated with preterm birth and low birth weight.

Jood et .al (2002) showed Average daily food intake of 90 rural pregnant women belonging to arid, semi-arid and wet zones of Haryana state intake of cereals, pulse, roots and tubers, other

vegetable and sugar and jaggary by the respondentss were significantly lower than the prescribed Indian Recommended Dietary Intake (RDI) The consumption of milk and milk products and fats and oils was significantly higher than that of RDI whereas, qreen leafy vegetables and fruits were the most limited food items. As the diet of rural pregnant women were inadequate with respect to some food group which resulted in lower intake of protein, beta-carotene and ascorbic acid.

Arturo, et al (2002), studied anemia during pregnancy According to WHO guidelines (Hb<11g/dl), iron deficiency was considered when serum ferritin level was< 12ng/ml, and when serum folate level was 3ng/ml, it was considered as folate deficiency. 630 pregnant women (mean ± SD age, 24 ± 6.4 years) having an average of, Hb 11.38+ 1.47g/dl [95%CI=11.27to 11.50] were studied No patient had hemolytic anemia nor clinical infections. Almost all patients were from low or very low socioeconomic status. Prevalence of anemia was 34.44% (Severe: 1.8% moderate; 15.2%, and mild:83%) Iron deficiency anemia (IDA) was present in 39.2% (95% C I=32.7to 45.7), Prevalence of folate deficiency anemia (FDA) occurred in 11.52% (95% CI=7.27% to 15.7%). Prevalence of anemia during pregnancy was found to be high.

Gopladas, (2002), studied on iron deficiency anemia in young working women can be reduced by increasing the consumption of cereal based fermented food or gooseberry at the work place and reported that to determine behavioral change and improvement in their iron deficiency anemia status "maximum weight was given to increase consumption of idli a popular cereal based fermented food or gooseberry juice". For small factories were selected in pariaurban Bang lore with a sample of 302 women. "The 180 day intervention were supervise at a work shop" Show that the type of work lunch of greeter significant then IEC knowledge were impressive but behavior change was not sustained it was concluded that the hemoglobin level of the worker cab easily cost effective workplace lunches that also lead to better employer- employee relation.

Rajanatnam et. al, (2002), studied maternal anemia a persistent problem in rural Tamilnadu and reported that iron deficiency anemia as a defined by Hb< 11g/dl and SF<12 microgram the prevalence of maternal anemia or and iron deficiency anemia continue to be high in spite of plant intervention implemented at national level.

Abel et al. (2001), expected that the prevalence of anemia (Hb <11g/d1) was 56.6%. 70.2% and 69.5% respectively among the first second and third trimester women. The mean Hb of 10.7g/dl was significantly higher among the first trimester than among the second and third trimester women, which was less than the recommended value of 11g/dl Iron deficiency (SF<12 micro g/l) was significantly (P<0.05) more among the third trimester women than among the first.

Rawat et. al, (2001), studied on prevalence of anemia among adolescent girl in rural areas of district Meerut U.P. reported that anemia was found to be significant associated with educational status (P <0.05), birth order <P<0.05), awareness regarding anemia (P<0.05), and marital and obstetric status (P<0.05) with no association with age anthropometry and monarchal age (P>0.05).

Raysk et. al. (2000) focused that amongst this group 72.2% were partially consuming these tablets. Main reason for irregular or partial consumption was inability to purchase iron tablets (52.63% . Around 16% mothers were taking rest for 2 hours at daytime during pregnancy were registered (36.23%). Focus group discussion highlighted some factors regarding improvement of the situation.

Agarwal et. al. (1999) examined a total of 653 women in third trimester of pregnancy for the presence of anemia in Kanksha and Ausgram IInd block of Burdwan 80% of them were found anemic (hemoglobin level< 11gm%). 67% of the pregnant women took iron folates till varied periods Iron deficiency was the commonest cause for the anemia.

Fujimori et. al (1999), studied on Iron Nutritional status in pregnant Adolescents. Sao Paulo, Brazil they have resulted that the frequency of anemia, iron, deficiency and iron body stores was assessed in 155 prenatal care unit of a beneficent hospital in Sao Paulo and it is concluded that the iron Nutritional status of these adolescents were characteristics of the pregravidic inadequate iron stores Despite low percentage of the anemia the high frequency of iron deficiency and depleted iron stores suggest a practical procedure to detect iron deficiency and depleted iron stores suggest a practical procedure to detect iron deficiency and the use of iron supplementation in teenagers.

Panwar et al (1998) carried out a study on average daily food intakes of 90 rural pregnant women of farming and non-farming communities of Northern Indian intakes of cereals, pulse, roots and

tubers and sugar and jaggery, by both farming and non-farming females were significantly lower than the prescribed Indian recommended dietary intake (RDI). The consumption of milk and milk products and fats and oils was adequate whereas green leafy vegetables and fruits s were the most limited food items. No significant overall differences were observed between females from farming and non-farming backgrounds, level of education did not show significant influence on intake of different food items. The consumption of fruits and green leafy vegetables with the increase in family monthly income.

Rainville, (1998), found that the Pica has been reported to affect as many as 65% of American African women a group also at higher risk of delivering preterm & low birth weight. infant of 281 pregnant subject there was a significant association b/w pica & low maternal haemoglobin levels Dietician should ask pregnant women with anemia about pica and explain it risk.

Panwar et.al. (1998) conducted a study on the daily nutrient intake of 90 pregnant women from farming and non-farming communities in six rural villages of Haryana state, Northern India mean daily intakes of farming and non-farming pregnant women

examined in this study were lower for energy, calcium and iron than the recently prescribed Indian recommended dietary allowances (RDAs). Protein intake of non-farming women was significantly lower and that of farming women was almost similar to RDA . Intake of fat by pregnant women was double the RDA. The mean daily intake of thiamine, riboflavin and niacin by women of both the communities were found to be adequate. The diets of pregnant women could meet half the requirement of folic acid and even less than half for ascorbic acid.

Schall (1998), studied on High third trimester ferritin concentration associations with very preterm delivery infection and maternal nutritional status. He has Reported that the high serum ferritin concentration in the third trimester resulting from a failure of ferritin to decline is associated with very preterm delivery and markers of maternal infection poor maternal nutritional status nutritional status earlier in pregnancy under lie this relationship.

Preziosi, et. al. (1997). Studied that the one hundred and 97 pregnant women were selected at 28 weeks of gestation. 99 women received 100mg/day of elemental iron for the remainder of their pregnancy. 98 women received a placebo. In the iron supplemented

group anemia and Iron deficiency were reduced in the last trimester, whereas the incidence remained constant in the placebo group. Three month after delivery. There was an increased rate of anemia in the placebo group. Infants of mothers in the supplemented group had higher serum ferritin levels

Hutter (1996) studied a common custom in developing countries is reduction of food intake during pregnancy, especially in the last trimester. A group of 186 women in a rural area of Karnataka were followed throughout pregnancy. Their average daily energy intake during pregnancy was 1700- kcal. A trend of declining daily energy intake within subjects over the whole period of pregnancy was observed, the biggest change-taking place between month 5/6/7 and month 8/9. The major determinant of change in energy intake turned out to be prepregnancy nutritional status, i.e. chronic energy deficiency (CED), measured by body mass index (BMI). Result indicates that women who were better nourished before they became pregnant were more likely to reduce energy intake during pregnancy.

Wahab. et al, - (1994) studied that The dietary pattern of 125 pregnant women attending the Urban Health Centre was studied. The average consumption of most of the food groups nutrients and

calories were below the daily-recommended allowances. Pallor, glossitis, koilonychias and tender calves were common clinical findings. While most of the pregnant women were aware of the fact that there is need for more quantity of proteins and certain foods during pregnancy . However most of them did not consume them. Many avoided certain food items because they believed that these items posed bad effects on the baby.

Chapter - 3

Material & Methods

MATERIALS AND METHODS

This chapter contains relevant information pertaining to the research design and methodological step used for present investigation. The research procedures followed have been distinctly described under the following sub-heads-

3.1 Locale of study

3.2 Sampling procedure

3.3 Development and pretesting of questionnaire

3.4 Variables and their measurements

3.4.1 Independent variables

3.4.2. Dependent variables

3.5 Data collection

3.6 Statistical Analysis

3.1 Locale of study :-

For carrying out the present study on dietary pattern of pregnant women, Bundelkhand region was selected purposively as the locale of the study as region has sufficient number of private nursing home hospital and primary health centre.

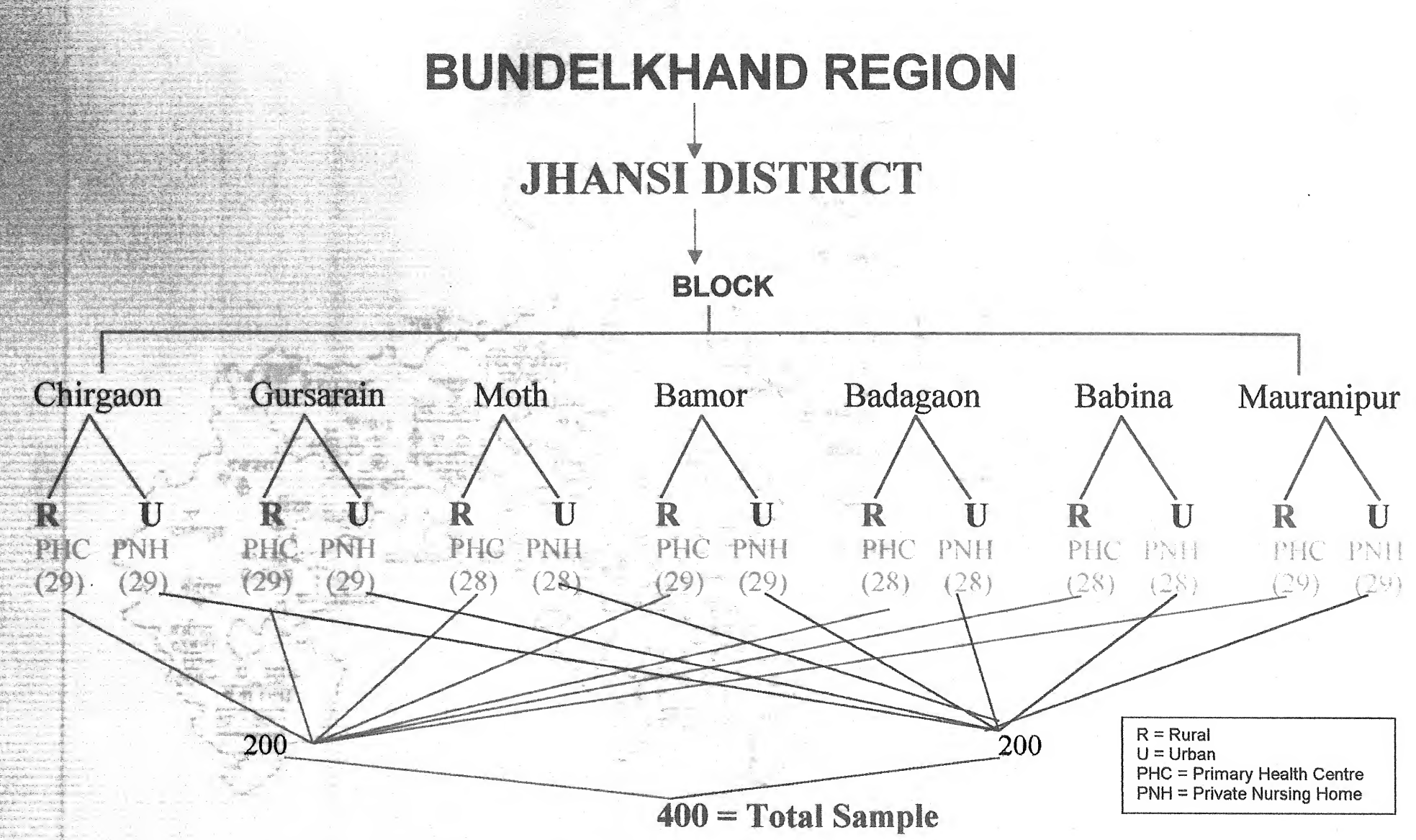
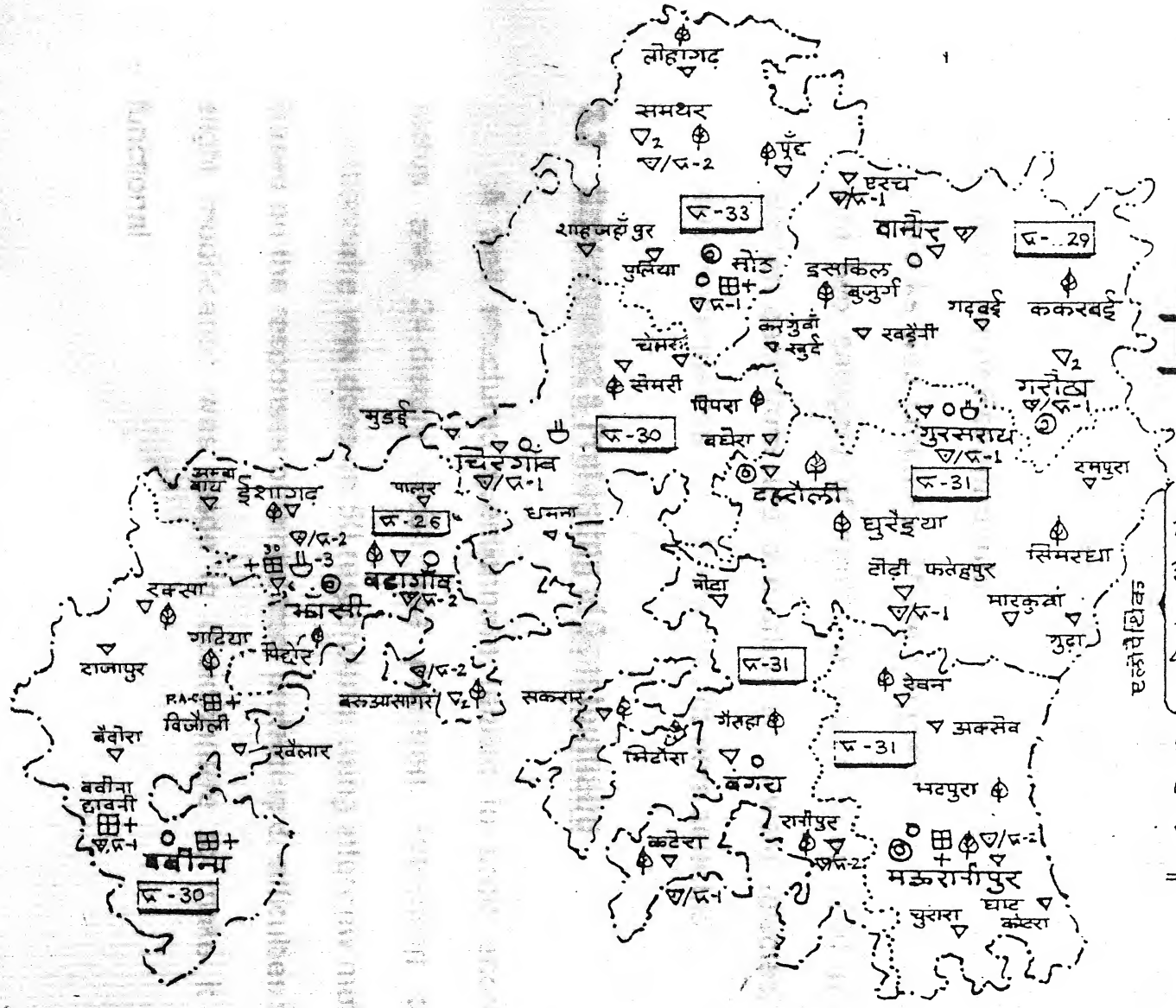
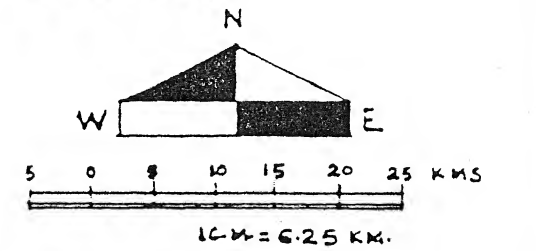


Fig. 1 : Sampling Design

जनपद - झाँसी





चिकित्सा सुविधायें

संकेत

1. चिकित्सालय/औषधालय ⊞/+35
2. प्राथमिक स्वास्थ्य केन्द्र ▽-51
3. नगरीय परिवार कल्याण - केन्द्र / उपकेन्द्र ▽/▽-20 (10) + (10)
4. विकास खण्ड में ग्रामीण परिवार कल्याण उपकेन्द्र ▽-241
5. आयुर्वेदिक चिकित्सालय ⓐ-24
6. यूनानी चिकित्सालय ∪-NIL
7. होम्योपैथिक चिकित्सालय ⏻-5

3.2 Sampling procedure :-

3.2.1 Selection of site: - Jhansi district of Bundelkhand region was selected an from this district seven blocks were selected randomly. These seven blocks were Chirgaon, Gursaria, Moth, Bamor, Badagaon, Babina, Mauranipur, and from these seven blocks, primary health centre and maternity hospital from both rural and urban areas were selected (fig.1)

3.2.2 Selection of Respondents: - The list of pregnant women from 7 blocks was prepared. These pregnant women were divided into two category of rural and urban areas, 200 pregnant women each from rural and urban areas were selected. Thus, 400 respondentss from Jhansi district were selected.

3.3 Development & Pretesting of Questionnaire

A well structured questionnaire related to socio economics status and 24-dietary recall was prepared. Pretesting of the questionnaire was done on 50 respondents using interview methods. Based on the responses obtained from pretesting & difficulties faced, slight modification was made in questionnaire to make it more functional.

3.4 Variable and their measurements

3.4.1. Dependent variables: Prevalence of anemia in pregnant women was taken as dependent variable

3.4.2. Independent variable-

Age -: The chronological age of pregnant women at the time of investigation was taken. All pregnant women were listed according to following age groups and given the scores as follows:

Age (in years)	Scores
18-23	1
24 -29	2
30 -35	3

Education of respondents: Education was operationalised as the number of years of formal education obtained by the respondentss. Scores assigned to different categories was as follows:

Education qualifications	Scores
Illiterate	0
Just literate	1
Primary school	2
Junior High School	3
High School	4
Intermediate	5
Graduation and above	6

Total income of the family: The amount of money earned by the family in a month was measured by recording total income of the family from all sources. The recorded total income per month was divided into three categories and scores were assigned to different categories as given below:

Total income /month (Rs.)	Scores
Income group (Rs. 1000-3000)	1
Income group (Rs. 3000-5000)	2
Income group (Rs. 5000 -7000)	3
Income group (Rs.7000< above)	4

Occupation of the head respondents family: It has been defined as the specific work a person does to earn livelihood. Scores assigned to different categories were as follows:

Occupation	Scores
Agriculture	1
Business	2
Service	3
Labor	4
Others	5

Caste : The subjects of the present investigation were grouped into three categories i.e. lower, middle and higher caste. The scores were assigned as follows:

Caste	Scores
Higher caste	1
Middle caste	2
Lower caste	3

Family type: Family type was divided into two major categories viz. nuclear and joint. Nuclear type was referred to the family composing of parents and their children only while joint family referred to the family including other persons related to them. The scoring procedure adopted was taken from the modified socio-economic status scale for rural of *Kulshresta* (1972):

Family type	Scores
Nuclear Family	1
Joint family	2

Size of family: Size of family is defined as the total number of member & present in the family. Kulshresta's modified SES Scale (1972) was used to quantify the size of the family. Scores assigned to different categories were as follows:

Size of family	Scores
Small family (Up to 5)	1
Medium family (5-10)	2
Large family (Above 10)	3

3.5 Data Collection

(A) **Hemoglobin Estimation**: - was carried out at the spot by standard shell's method *(Hunter and Buford, (1958)*. The graduated hemoglobin meter tube was filled, roughly up to the mark of 10 percent, with N/10 Hcl. The pipette was filled up to mark of 20 c.m with blood, obtained from finger prick using aseptic technique, and blown gently into the tube. The pipette was rinsed several times with the acid solution in the tube. The letter was allowed to stand for five minutes. Distilled water was then added drop by drop with the help of a dropper. After addition of each drop, the fluid in the tube was stirred with a small glass rod. It was continued until the tint in the tube matched with the standard. Comparisons were made in daylight. Reading was taken one minute after the addition of another drop of water and if necessary more average of the two readings was accepted as the final result. Results were expressed in gm. per 100 ml.

(B) Information on the family composition, their dietary habit and intake of food articles, in last 24 hours, by the respondents were recorded. Nutrient intakes were worked- out in terms of energy, protein, calcium, iron, with the help of the tables,

designed by Indian Council of Medical Research for the purpose.

(C) **Follow-up of Pregnant Women** : - Follow-up examination, of the study women who has been registered in first and second trimesters of their pregnancy, was carried-out during second and third trimesters respectively at an average interval of about 3 months. Here too, general and systemic examination were conducted to detect their deviations, if any, from their previous findings. Hemoglobin estimation and general blood picture examination were also repeated following the procedure, indicated earlier.

3.5.1 Nutritional status: Nutrients intake of the subjects was determined by weighment and actual and actual analysis of composite diets.

Nutrient intake: A structured interview schedule was developed and pretested before use. Data were collected by paying personal visits to the respondentss. Information regarding the intake o food for three consecutive days was collected from respondentss form respondentss using measures including katories, spoons and glasses of standard sizes were shown to the respondentss and used in order to estimate the amount of raw ingredients used and cooked food

consumed. Food intake was recorded in terms of grams and milliliters. Nutrients namely, energy, protein, fat, calcium.

3.6 Statistical Analysis

Keeping in view the objectives of the study the data was collected on both the groups – the control group and experimental group were subjected to statistical analysis. The collected data were scrutinized, coded, quantified, tabulated and compiled systematically to commensurate with the objectives of the study. Appropriate statistical tools and test were applied to draw inferences.

Frequency and percentage:- Frequency and percentage were obtained to know the distribution of both dependent and independent variables of the study.

Chi –square test:- Chi –square test was applied to establish the association between dependent and independent variables. Chi – square was computed by the application of the formula.

$$\chi 2 = \Sigma \frac{(f-F)}{F}$$

where, f is the observed frequency

F is the expected frequency

Chapter - 4

Result and Discussion

RESULTS AND DISCUSSION

This chapter present the results obtain after collection, tabulation and analysis of the data. The finding of the study have been presented and discussed under the following sections :-

4.1 Socio-personal and economic profile of respondents

4.1.1 Profile of the respondents of rural population

4.1.2 Profile of the respondents of urban population

4.2 Distribution of extent of anemia in population of Bundelkhand Region

4.3 Distribution of severity of anemia in all three trimesters in both rural and urban population.

4.4 Nutrients intake

4.4.1 Daily nutrients intake 'affecting prevalence of anemia in rural population

4.4.2 Daily nutrients intake affecting prevalence of anemia in urban population.

4.5 Prevalence of extent of anemia in accordance with socio personal and economic factors in rural and urban pregnancy.

4.6 Association of socio-personal and economic factor of respondents with prevalence of anemia

4.6.1 Association of socio personal factors with anemia.

4.6.2 Association of family factors with anemia.

4.7 Association of nutrients intake with prevalence of anemia

4.8 Total prevalence of anemia in rural and urban areas

4.9 Total prevalence of anemia rural and urban respondents based on socio-personal and economic profile

4.10 Total Frequency distribution of daily intake of different nutrients of rural and urban respondents

4.11 Appropriate remedies suggested for controlling anemia in pregnancy.

TABLE –1

Distribution of rural respondents according to their socio personal-economic profile

N=200

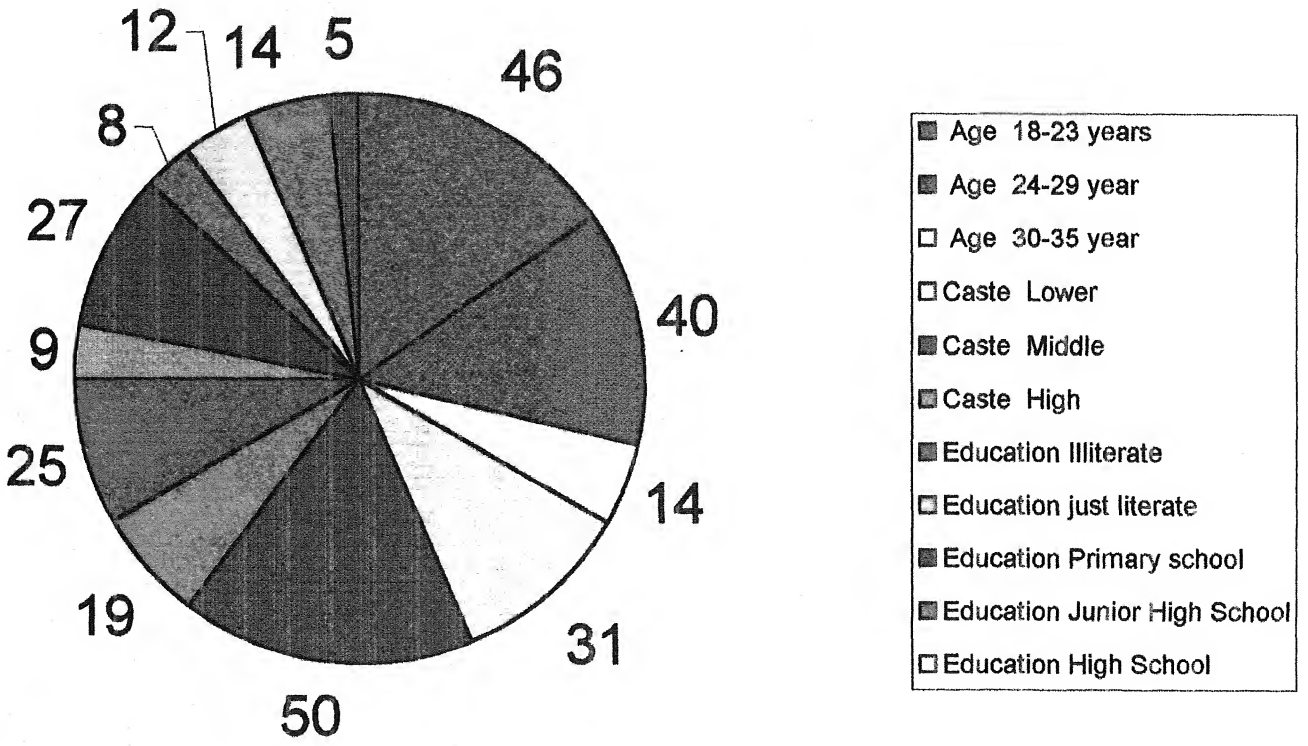
S. No	Variable	No. of Respondents
Personal Variables		
1. Age	18-23 years	91 (46)
	24-29 year	80 (40)
	30-35 year	29 (14)
2. Caste	Lower	62 (31)
	Middle	99 (50)
	High	39 (19)
3. Education	Illiterate	51 (25)
	just literate	19 (09)
	Primary school	53 (27)
	Junior High School	15 (08)
	High School	25 (12)
	Inter	27 (14)
	Graduate & above	10 (05)

Family Variables		
4.Type of family	Nuclear	72 (36)
	Joint	128 (64)
5. Size of family	Small	62 (31)
	Medium	101 (51)
	Large	37 (18)
6.Monthly income	Rs.1000-3000	97 (49)
	Rs.3000-5000	32 (16)
	Rs.5000-7000	22 (11)
	Rs.7000 ≤ above	49 (24)
7. Occupation of family	Agriculture	84 (42)
	Business	18 (09)
	Service	26 (13)
	Labor	62 (31)
	Other	10 (05)

Figure in parenthesis indicate percentages

N= Total no. of respondents

Fig. 2. Socio Personal Variables of rural respondents



4.1 Socio personal and economic profile of respondents :-

In this section percentage distribution of respondents according to their socio personal and economic factor have been presented.

4.1.1 Profile of the respondents of rural population:-

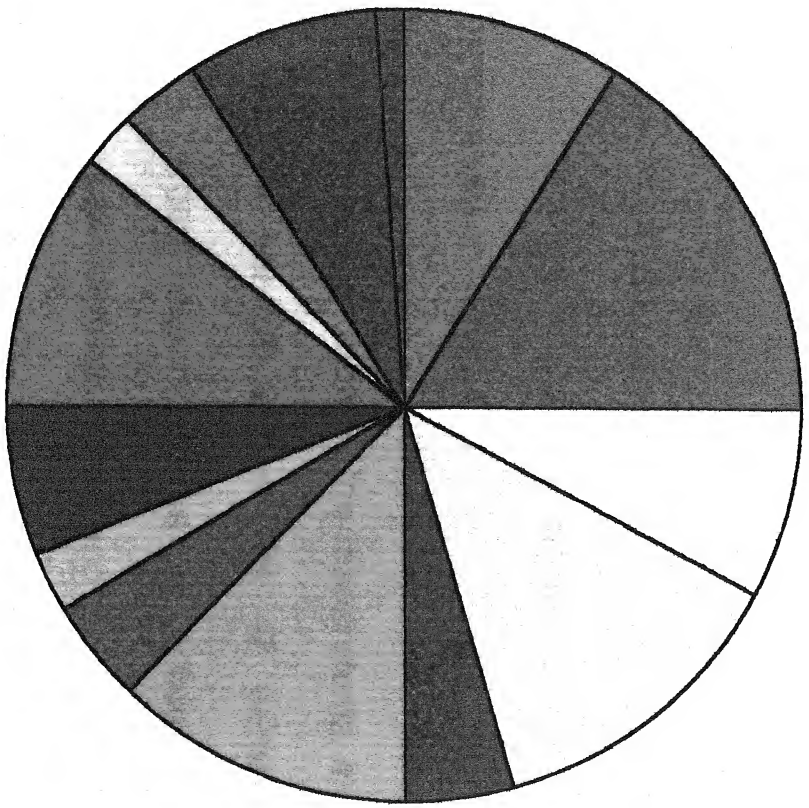
Personal variables

The data presented in Table-1 reveals that 46 percent respondents were in the chronological age group 18-23 years, 40 percent were in the age group of 24-29 years and only 14 percent were 30-35 years old.

As regard the caste of the respondents 50 percent of the respondents belongs to middle caste, 31 percent to low caste while only 19 percent respondents belong to high caste.

As regard the education of the respondents, it was observed that maximum number of respondents (i.e. –27 percent) were educated up to primary followed by 25 percent respondents who were illiterate. Fourteen percent respondents were educated up to Inter, 12 percent were educated up to High School and rest of the respondents were just literate, junior high school passed and graduate (i.e. 9, 8 and 5 percent) respectively (fig.2).

Fig. 3. Family Variables of rural respodents



- Type of family Nuclear
- Type of family Joint
- Size of family Small
- Size of family Medium
- Size of family Large
- Monthly income Rs.1000-3000
- Monthly income Rs.3000-5000
- Monthly income Rs.5000-7000
- Monthly income Rs.7000 £ above
- Occupation of family Agriculture
- Occupation of family Business
- Occupation of family Service
- Occupation of family Labour
- Occupation of family Other

Family variables

Observation on family variable revealed that 64 percent respondents belong to joint families and 36 percent belong to nuclear families.

Table-1 further reveals that 51 percent of the respondents belong to medium size families 31 percent were from small size families and only 18 percent of respondents were from large size families.

It was observed that 49 percent of the respondents have monthly income between Rs. 1000-3000, 24 percent were having monthly income Rs. 7000-above and rest of the respondents were is Rs. 3000-5000 and Rs. 5000-7000 income group (ie 16 and 11 percent) respectively.

As the occupation of family of the respondents, it was observed that maximum number of respondents 42 percent under the agriculture. 31 percent respondents belong to business and rest of the respondents under service, labour and other occupation (ie 13,9 and 5, percent) respectively (fig.3).

Majority of rural responds were in the age group of 18-23 years belong to middle caste and were educated up to primary. Mostly rural respondents were from joint and medium size family having agriculture as occupation and having monthly between income Rs 1000-3000.

TABLE – 2

Distribution of urban respondents according to their socio personal-economic profile

N=200

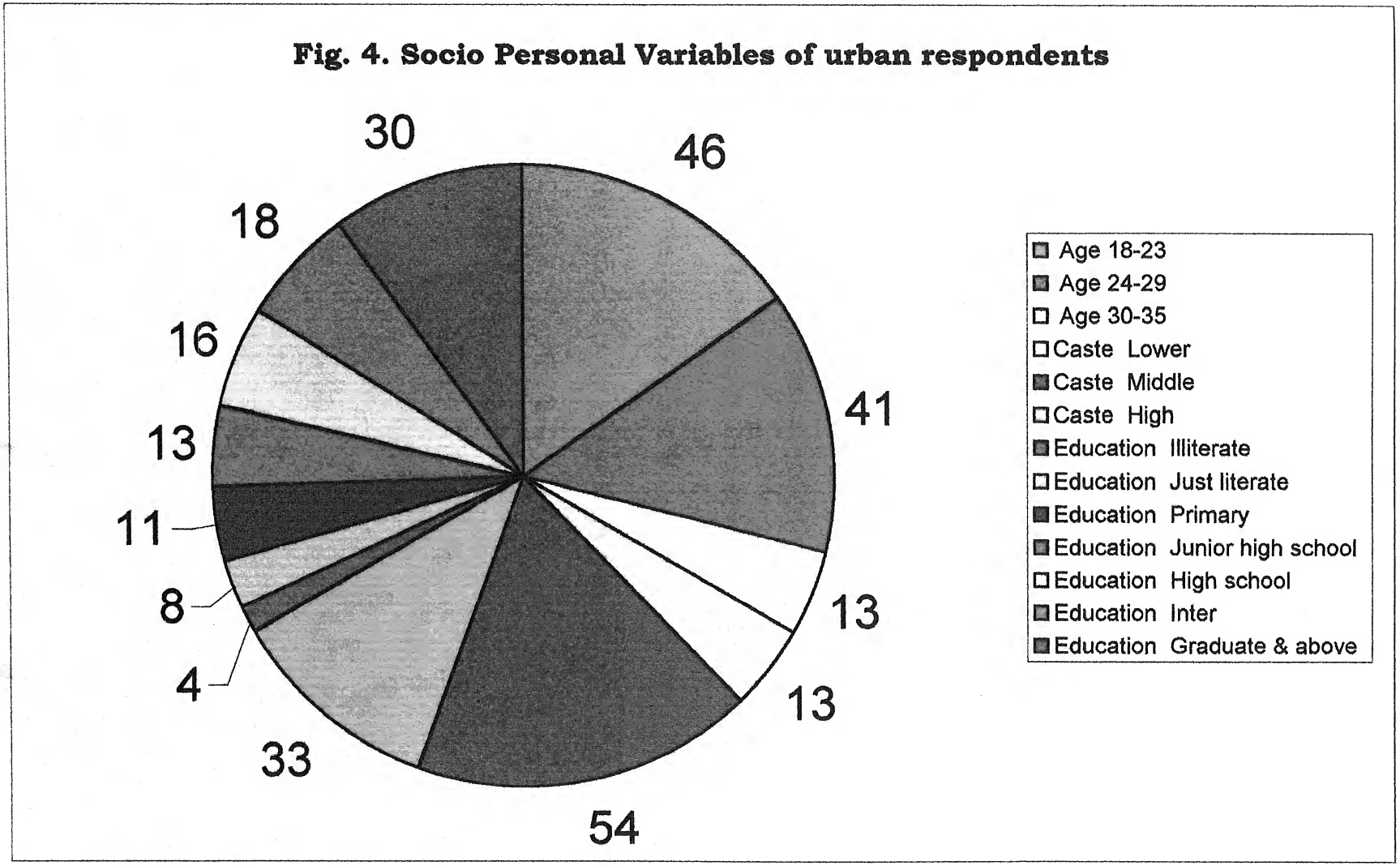
S. No	Variable	No. of Respondents
Personal Variables		
1. Age	18-23 years	92 (46)
	24-29 year	81 (41)
	30-35 year	27 (13)
2. Caste	Lower	25 (13)
	Middle	108 (54)
	High	67 (33)
3. Education	Illiterate	09 (04)
	just literate	16 (08)
	Primary school	21 (11)
	Junior High School	25 (13)
	High School	33 (16)
	Inter	35 (18)
	Graduate & above	61 (30)

Family Variables		
4.Type of family	Nuclear	119 (60)
	Joint	81 (40)
5. Size of family	Small	85 (43)
	Medium	89 (44)
	Large	26 (13)
6.Monthly income	Rs.1000-3000	21 (11)
	Rs.3000-5000	36 (18)
	Rs.5000-7000	62 (31)
	Rs.7000 ≤ above	81 (40)
7. Occupation of family	Agriculture	45 (23)
	Business	36 (18)
	Service	80 (46)
	Labor	Nil
	Other	39 (19)

Figure in parenthesis indicate percentages

N= Total no. of respondents

Fig. 4. Socio Personal Variables of urban respondents



4.1.2 Profile of the respondents of urban population:-

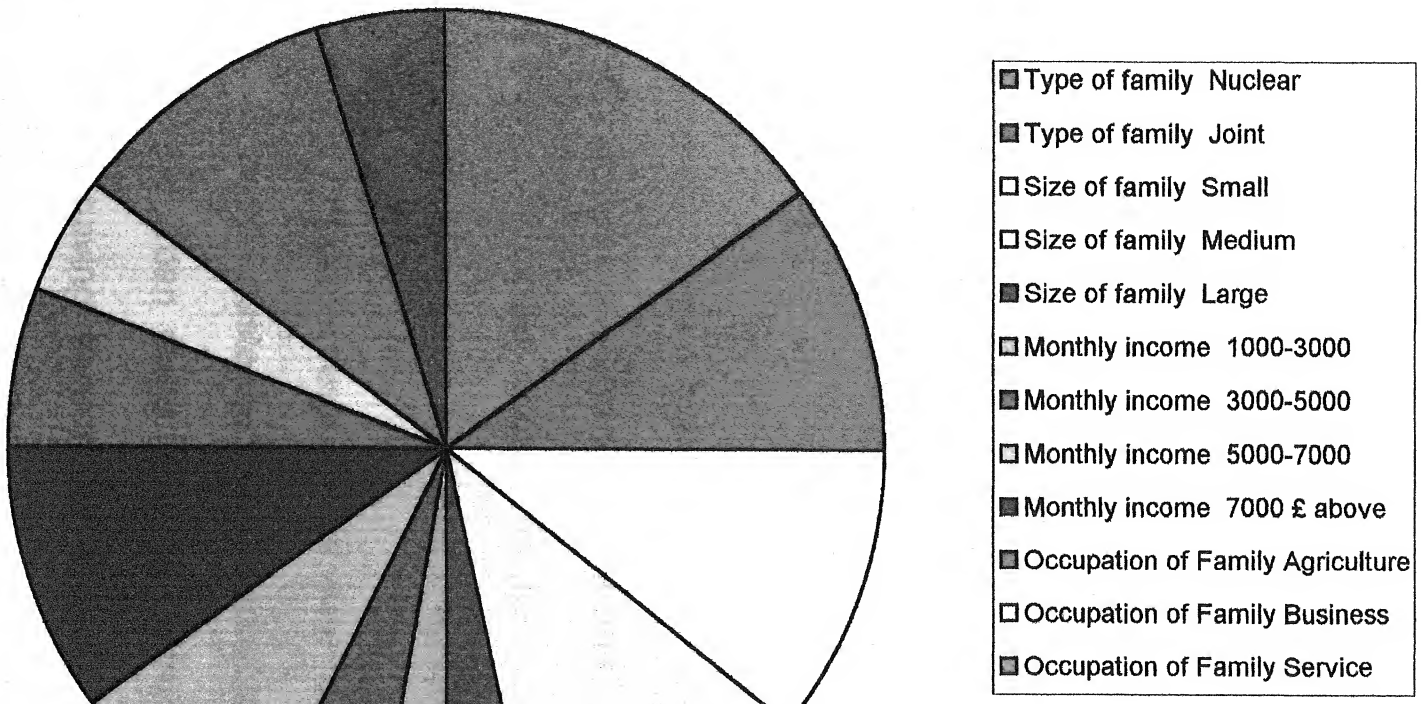
Personal variables

The data presented in Table-2 reveals that 46 percent respondents were in the chronological age group 18-23 years, 41 percent were in the age group of 24-29 years, and only 13 percent were 30-35 years old.

As regard as the caste of the respondents 54 percent of the respondents belong to middle caste, 33 percent to higher caste and only 13 percent respondents belong to lower caste.

As regard the education of the respondents, it was observed that maximum number of respondents (i.e.30%) were educated up to graduattion followed by 18 percent respondents who were inter, 16 percent respondents were educated up to high school, 13 percent were educated up to junior high school and rest of the respondents were primary, just literate and illiterate (i.e. 11,8 and 4%) respectively (fig. 4) .

Fig. 5. Family Variables of urban respondents



Family variables

It was observed that 60 percent respondents were from nuclear families and 40 percent were from joint families.

Table-2 further reveals that 44 percent of the respondents belong to medium size families, 43 percent were from small size families and only 13 percent of respondents were from large size families.

Table –2 further showed that 40 percent of the respondents have monthly income between Rs. 7000< above, 31 percent were having monthly income Rs. 5000-7000 and rest of the respondents were in Rs. 3000-5000 and Rs. 1000-3000 income group (i.e. 18 and 11 %) respectively.

Occupation profile indicate that 40 percent respondents were under the service class and similar percentage of respondents under the business and other occupation (i.e. 18 and 19% respectively). Only 23 percent respondents belong to agriculture occupation (fig.5).

Majority of urban respondents were in the age of 18-23 years belong to middle caste and were educated up to graduation and above. Mostly urban respondents were from nuclear and medium size families having service as occupation and having monthly income more than Rs. 7000.

TABLE –3

Frequency distribution of prevalence of anemia in rural and urban areas

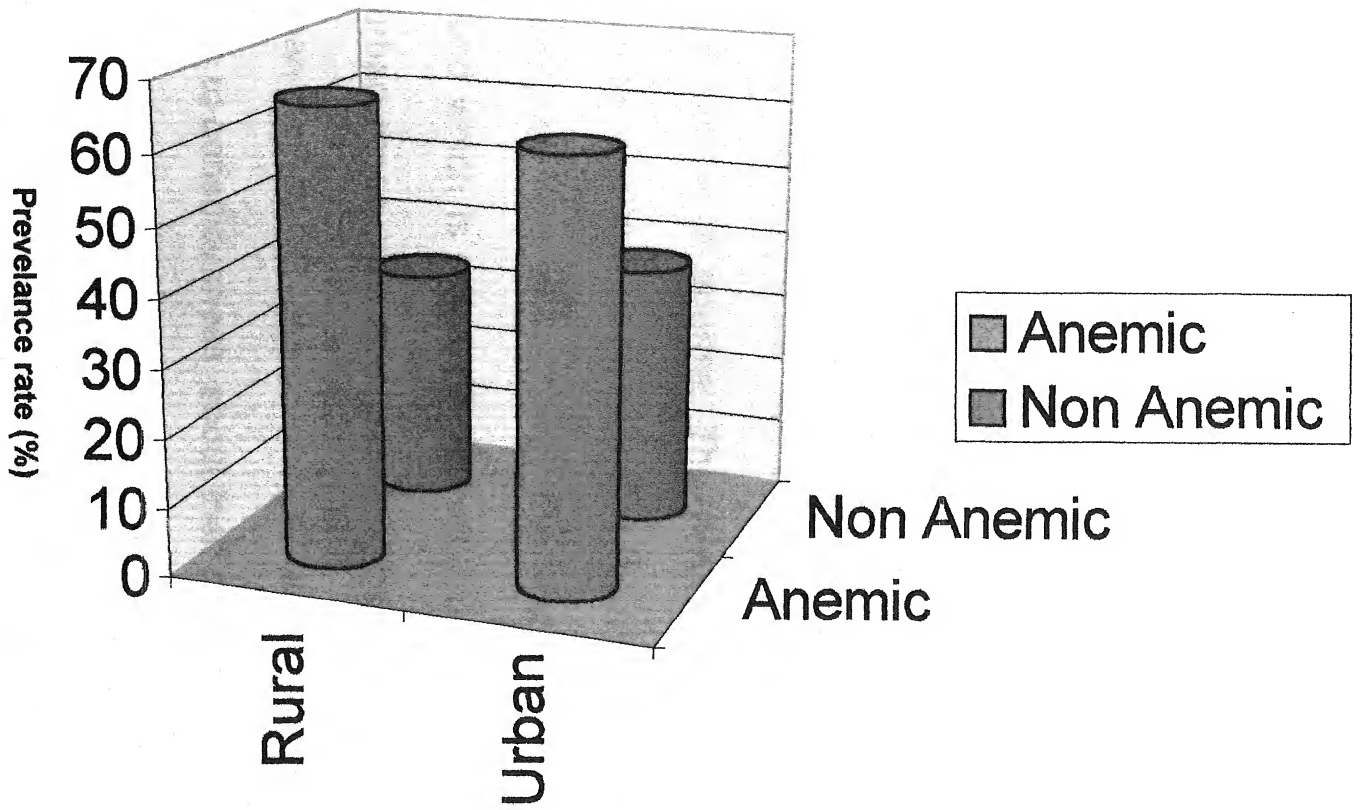
N=400

	Respondents	
	Rural	Urban
Anemic	131 (66)	124 (62)
Non Anemic	69 (34)	76 (38)

Figure in parenthesis indicate percentages

N= Total no. of respondents

Fig. 6. Prevalence of anemia in rural and urban areas



4.2 Distribution of extent of anemia in population of Bundelkhand Region: -

The data in table –3 showed that about 66 percent respondents were anemic in rural population while only 34 percent were in the category of non-anemic where as 62 percent respondents were anemic in urban population and only 38 percent were in the category of non anemic (fig.6) .

The difference between rural and urban is quite less for prevalence of anemia. The pregnant women in rural areas take proper diet due to custom that they will eat after serving each and every member of the family with that reason at the end they get left food which is not a proper balanced diet. The pregnant women in urban areas were educated and also aware about the diet but even than they do not take proper diet due to laziness, ignorance and also due to consciousness about their physique.

TABLE –4

Frequency distribution of respondents according to severity level of anemia and trimesters

N=255

Level of Severity	Trimester			Mean	Trimester			Mean
	I n-65	II n-76	III n-59		I n-64	II n-79	III n-57	
Mild	13 (25)	21 (27)	14 (23)	16 (25)	20 (42.55)	18 (41.86)	13 (38.23)	17 (40.88)
Moderate	27 (52)	20 (26)	12 (20)	19.66 (32.66)	24 (51)	22 (51.2)	20 (58.8)	22 (53.66)
Severe	11 (21)	4 (5)	9 (15)	8 (13.66)	3 (6.4)	3 (6.97)	1 (2.9)	2.33 (5.42)
Total Anemic	51	45	35		47	43	35	

Figure in parenthesis indicate percentages

N= Total no. of respondents

Fig. 7. Severity level of anemia in rural respondnets according to trimester

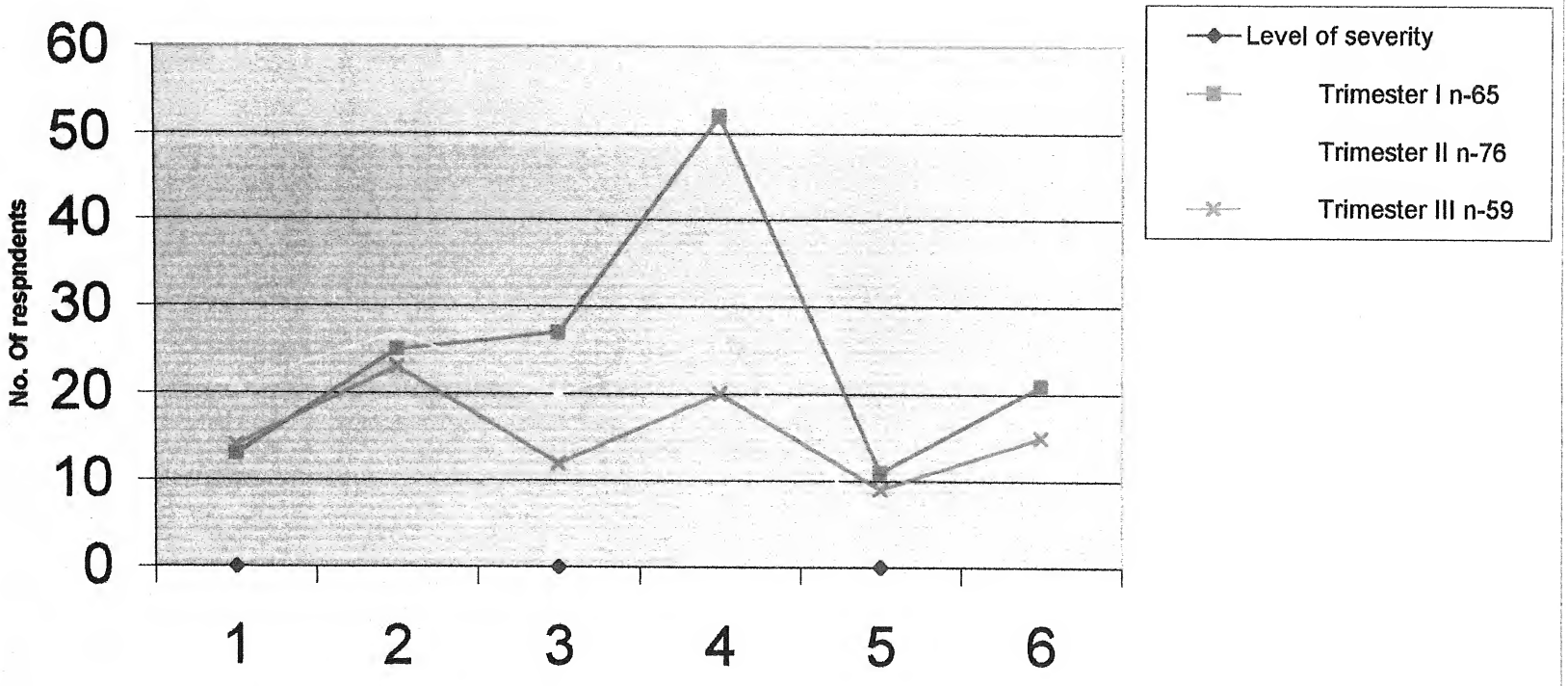
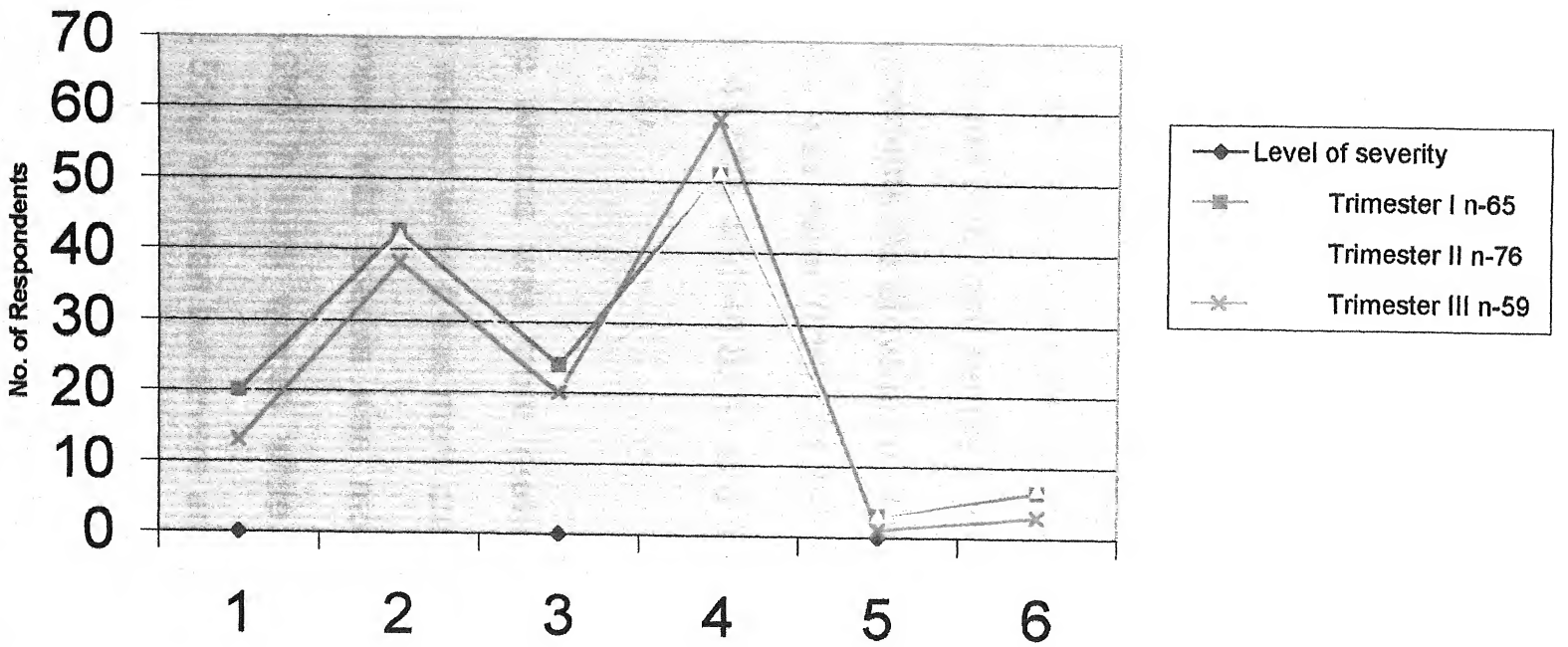


Fig. 8. Severity level of anemia in urban respondnets according to trimester



4.3 Distribution of severity of anemia in all three trimesters in both rural and urban population:-

The perusal of the data in table-4 revealed that irrespective of the trimester, the occurrence (%) of mild and moderate level of anemia was more in urban (40.88 and 53.66) than rural (25.00 and 32.66) while severe anemia was more in later 13.66 than former group 5.42 of respondents (fig.7).

With in the rural women, the occurrence of moderate anemia was more in all the three trimesters (52%, 26% and 32%) followed by mild (25%, 27% and 23%) and severe (21%5% and 15%) Similarly in the urban respondents the prevalence of moderate anemia in all the three trimesters was more (51%, 51.2% and 53.66%) followed by mild (42.55%, 41.86% and 40.88%) and severe (6.4,6.9 and 2.9%) respectively (fig.8).

Moderate anemia was more prevalent during Ist trimester (52%) in rural women while it was more during IIIrd trimester (52.8%) in urban women. Mild anemia was more prevalent during IInd trimester (46.6%) in rural women while it was more during Ist trimesters (42.55%) in urban but severe anemia was more prevalent during IIIrd trimesters (25.71%) in rural women while it was more during IInd trimester 6.9 percent in urban.

TABLE –5

Frequency distribution of daily intake of different nutrients of rural respondents

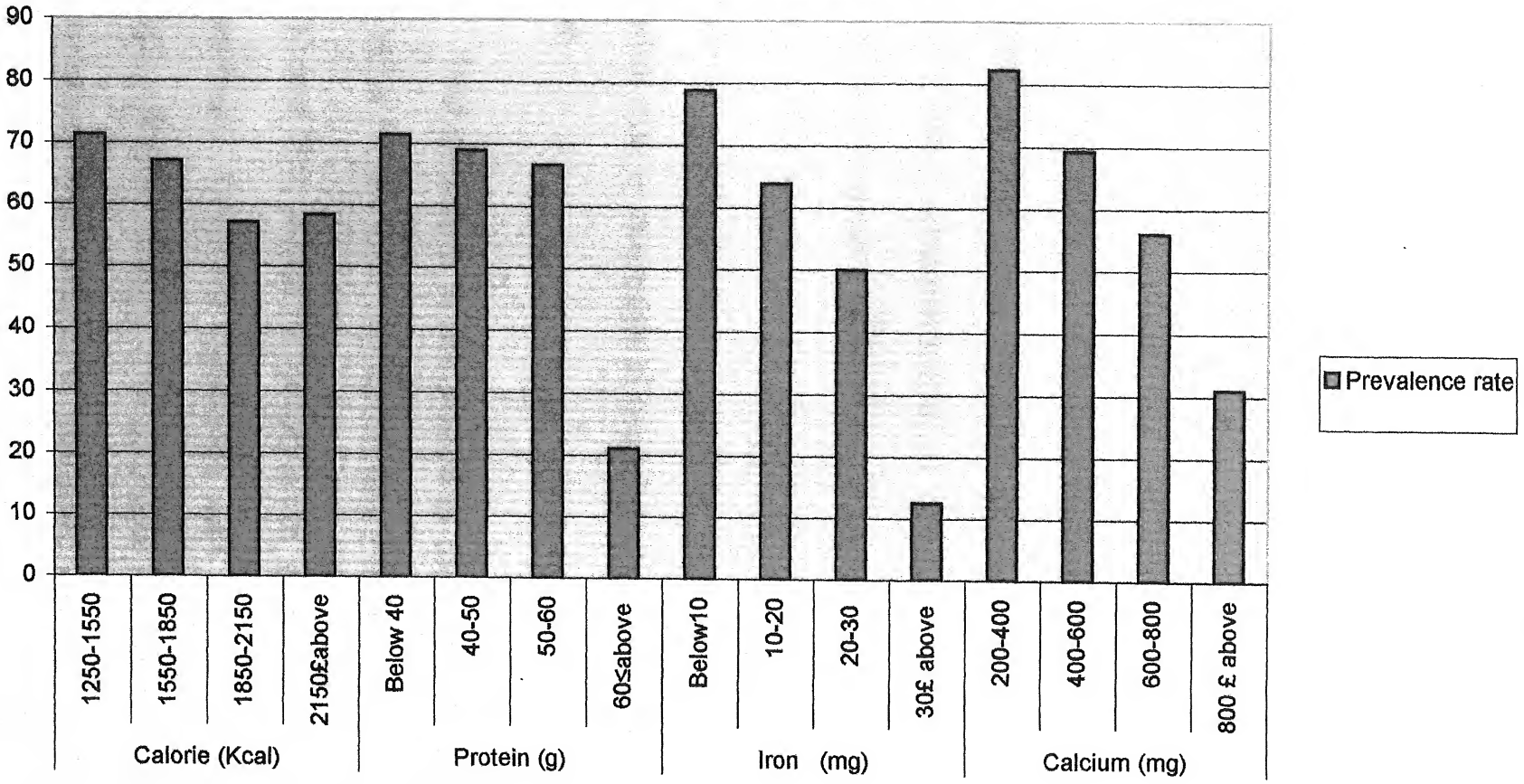
N=200

Nutrients	Variable	No. of respondents	Anemic respondents	Prevalence rate
Calorie (Kcal)	1250-1550	53 (27)	38 (29)	71.29
	1550-1850	88 (44)	59 (45)	67.04
	1850-2150	35 (17)	20 (15)	57.14
	2150≤above	24 (12)	14 (11)	58.33
Protein (g)	Below 40	112 (56)	80 (61)	71.42
	40-50	42 (21)	29 (22)	69.04
	50-60	27 (14)	18 (14)	66.66
	60≤ above	19 (9)	4 (3)	21.05
Iron (mg)	Below10	38 (19)	30 (23)	78.94
	10-20	144 (72)	92 (71)	63.88
	20-30	10 (5)	4 (4)	50
	30≤ above	8 (4)	1 (5)	12.5
Calcium (mg)	200-400	68 (34)	56 (43)	82.35
	400-600	62 (31)	43 (33)	69.35
	600-800	41 (20)	23 (18)	56.09
	800 ≤ above	29 (15)	9 (6)	31.03

Figure in parenthesis indicate percentages

N= Total no. of respondents

Fig. 9. Prevalence of anemia in Nutrients intake in rural respondents



4.4 Nutrients Intake

4.4.1 Daily nutrients intake of affecting prevalence of anemia in rural population.

Distribution of respondents in different levels/ categories based on level of calorie, protein, iron and intake vis-à-vis percentage occurrence of anemia in these categories have been of presented in table (5)

Occurrence (%) of anemia decreased in respondents with in the increasing dose / level of protein, and calcium while intake of iron and calorie had in consistent effect. (calorie where intake at 1250- 1550 Kcal had 29 percent occurrence of anemia and in iron where intake at below 10 milligram had 23 percent occurrence of anemia) Rest of the levels of calorie and iron showed the same trend of occurrence (%) of anemia that is decrease in respondents with the increasing dose or level.

Unit decrease in occurrence of anemia due to increasing level of calorie (1550-1850,1850-2150 and 2150 ≤ above) and iron (10-20, 20-30 and 30 ≤ above milligram) is (15, and 11 ; 71, 4 and 2 percent) respectively. Only the difference was found in the first level or category of both nutrient. The decrease in occurrence of anemia due to increasing level of protein (below 40, 40-50, 50-60 and 60 above)

and calcium (200-400, 400-600, 600-800 and 800 above) is for both nutrient (61,22,14 and 3 ; 43, 33, 18 and 6 percent) respectively (fig.9).

The reason may be that they were not aware of the ICMR recommended diet and they think that they will get iron after cooking the food in kadhai and also they think that two glasses of milk is sufficient to provide adequate calcium.

However findings of *Panwar B. et al* (1998) are in consonance to our findings who observed that nutrient intake is lower than recommended allowances.

TABLE -6

Frequency distribution of daily intake of different nutrients of urban respondents

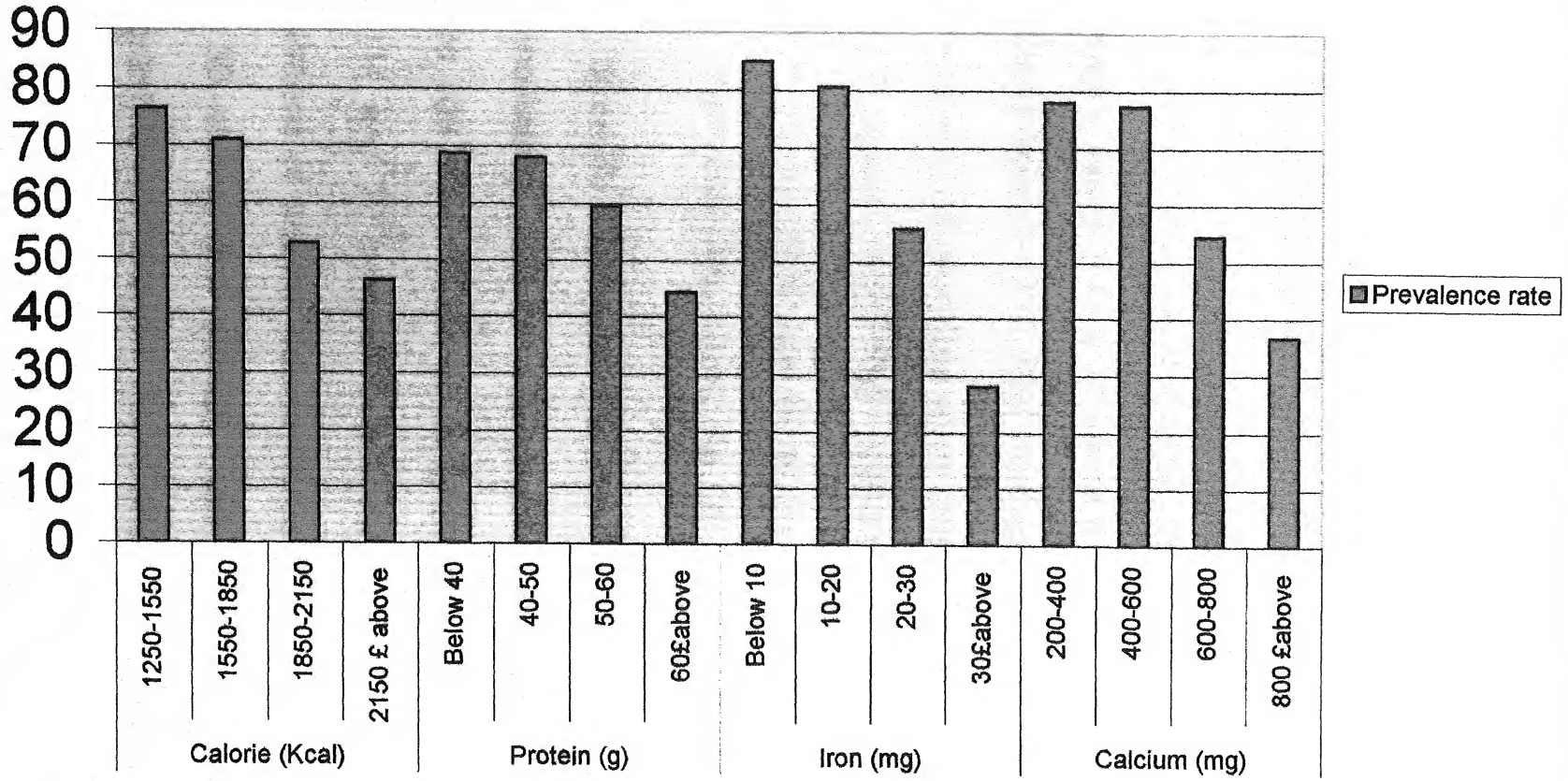
N=200

Nutrients	Variable	No. of respondents	Anemic respondents	Prevalence rate
Calorie (Kcal)	1250-1550	53 (19)	29 (23)	76.31
	1550-1850	62 (31)	44 (36)	70.96
	1850-2150	74 (37)	39 (31)	52.70
	2150≤above	26 (13)	12 (10)	46.15
Protein (g)	Below 40	48 (24)	33 (27)	68.75
	40-50	69 (35)	47 (38)	68.11
	50-60	47 (23)	28 (22)	59.57
	60≤ above	36 (18)	16 (13)	44.40
Iron (mg)	Below 10	20 (10)	17 (23)	85
	10-20	62 (31)	50 (71)	80.64
	20-30	86 (43)	48 (38)	55.81
	30≤ above	32 (16)	9 (7)	28.12
Calcium (mg)	200-400	41 (20)	32 (26)	78.04
	400-600	53 (27)	41 (33)	77.35
	600-800	68 (34)	37 (30)	54.41
	800 ≤ above	38 (14)	14 (11)	36.84

Figure in parenthesis indicate percentages

N= Total no. of respondents

Fig. 10. Prevalence of anemia in Nutrients intake in urban respondents



4.4.2 Daily nutrients intake affecting prevalence of anemia in urban respondents

Distribution of urban respondents in different levels or categories based on level, of calorie, protein, iron and calcium intake vis-a-vis percentage occurrence of anemia in these categories have been presented in table-6.

Occurrence (%) of anemia decrease in respondents with the increasing dose or level of calorie & protein except in on level where calorie in take at 1250-1550 Kcal and below 40 gm protein, (23 and 27 percent).Unit decrease in occurrence of anemia due to increased level of calorie (1550-1850, 1850-2150 and 21502 above Kcal) and protein (40-50, 50-60 and 60 above gm) is (36, 31 and 10 ; 38, 22 and 13 percent) respectively (fig.10).

Similarly occurrence (%) of anemia decrease in respondents w the increasing dose or level of iron and calcium except one level where iron intake below 10 milligram and calcium intake at 200-400 mg (14 and 20 percent respectively). Where as unit decrease in occurrence of anemia due to increasing level of iron (10-20, 20-30 and 30 above) and calcium (400-600, 600-800 and 800 above milligram) is (40, 38 and 7, 33, 30 and 11 percent respectively).

The reason might be that they are aware about their physique and don't take more calories and also misconception is there that due to heavy body they give birth to child by caesarian process. They also increase their iron and calcium-taking tablets as they avoid milk.

Findings of S.N. Wahab et al (1994) are at par to our findings that calorieand nutrient intake were below the daily recommended allowances .

TABLE-7

Prevalence of rural and urban respondents based on socio- personal and economic profile

N=255

S. No.	Variable	Rural n=131		Urban n=124	
		No. of respondents	Prevalence rate	No. of respondents	Prevalence rate
Personal					
Age in years	18-23	59 (45)	64.83	50 (40)	54.34
	24-29	53 (40)	66.25	58 (47)	71.60
	30-35	19 (15)	51.72	16 (13)	59.25
Caste	Lower	43 (33)	69.35	18 (15)	72
	Middle	64 (49)	64.64	61 (49)	56.48
	High	24 (18)	61.53	45 (36)	67.16
Education	Illiterate	38 (29)	74.50	6 (5)	66.66
	Just literate	12 (9)	63.15	11 (9)	68.75
	Primary Sc.	34 (26)	64.15	14 (11)	66.66
	Junior Hc.	11 (8)	73.33	18 (15)	72
	High Sc.	17 (13)	68	19 (15)	57.57
	Intermediate	14 (11)	51.85	20 (16)	57.14
	Graduate	5 (4)	50	36 (29)	59.01

Family Variable					
Type of family	Nuclear	39 (30)	54.16	75 (60)	63.02
	Joint	92 (70)	54.68	49 (40)	60.49
Size of family	Small	41 (31)	66.12	50 (40)	58.82
	Medium	65 (50)	64.35	57 (46)	64.04
	Large	25 (19)	67.56	17 (14)	65.38
Occupation	Agriculture	52 (40)	76.92	32 (26)	71.11
	Business	11 (8)	72.72	19 (15)	52.77
	Service	10 (8)	80	45 (36)	56.25
	Labor	51 (39)	76.47	-	---
	Other	7 (5)	71.42	28 (23)	71.79
Monthly income (Rs.)	1000-3000	77 (59)	79.38	14 (11)	66.66
	3000-5000	21 (16)	65.62	22 (18)	61.11
	5000-7000	13 (10)	59.09	46 (37)	74.19
	7000 ≤ above	20 (15)	40.8	42 (34)	51.85

Figure in parenthesis indicate percentages

N= Total no. of anemic respondents.

Fig. 11 Prevalence of anemia in rural and urban respondent based on Socio Personal variables

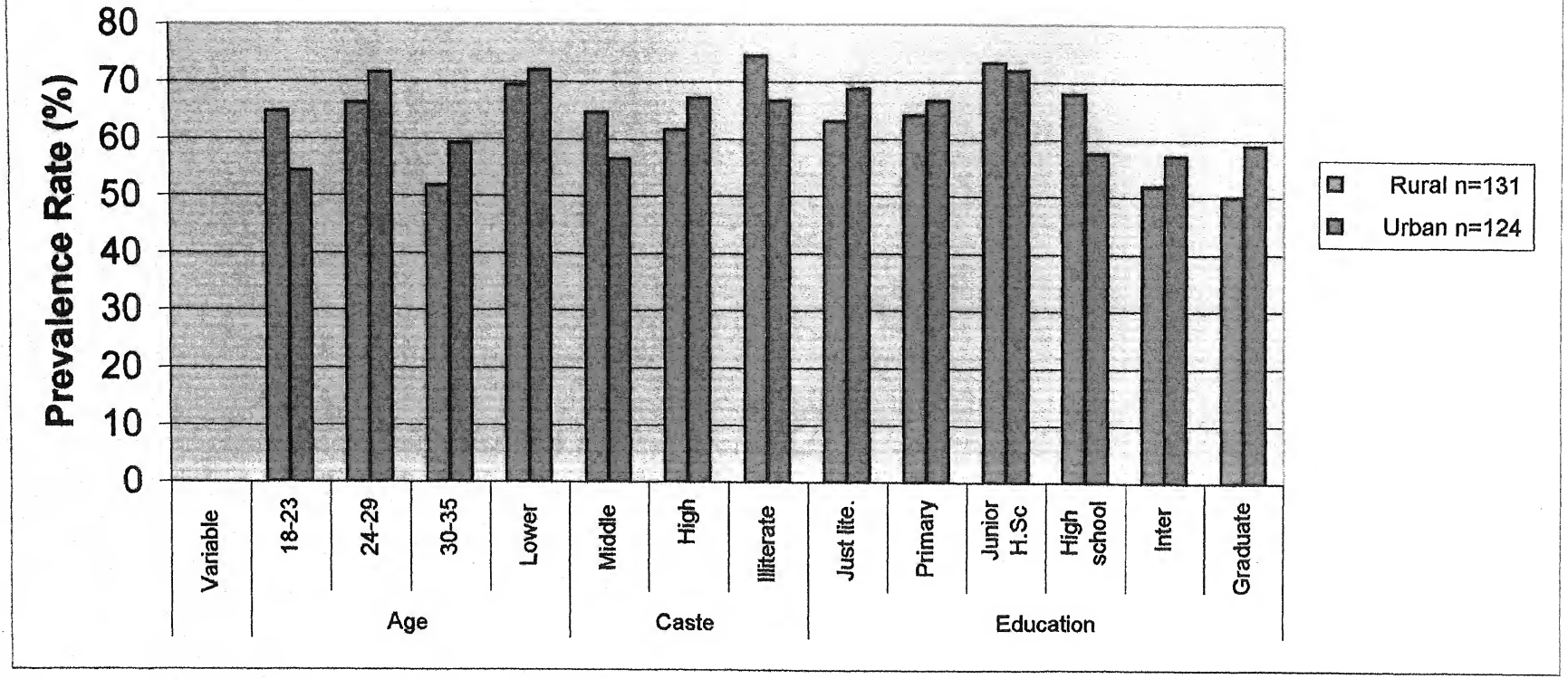
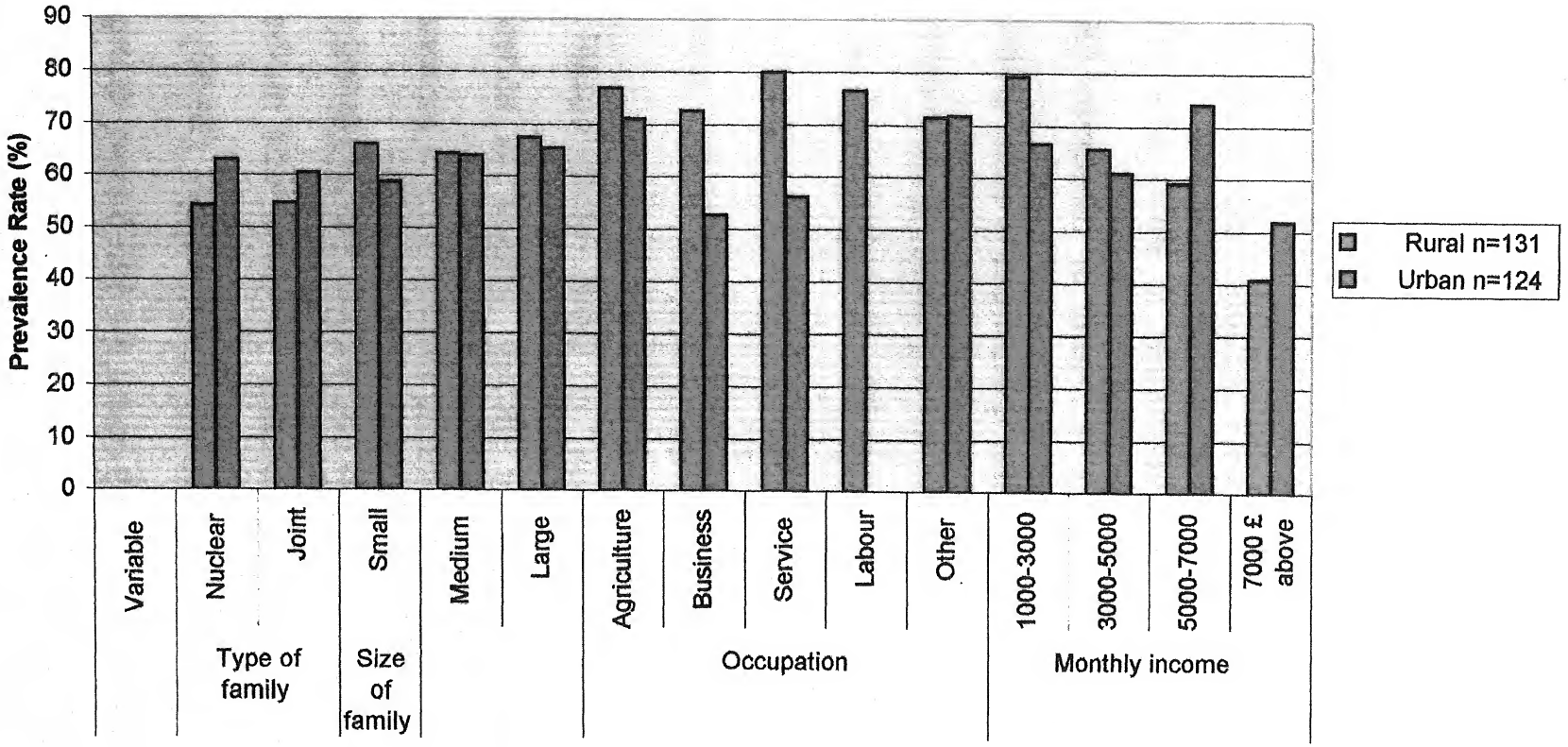


Fig. 12 Prevalence of anemia in rural and urban respondent based on family variables



4.5 Prevalence of extent of anemia in accordance with socio personal & economic factors in rural and urban pregnancy

Results on prevalence of anemia among rural and urban respondents with their socio-economic profile have been elucidated in table (7). Respondents between age group of 24-29 have higher prevalence of anemic (66.25) compared to lowest in age group of 30-35 (51.72) in rural category. However in urban group infestation of anemia was more in respondents of age group between 24-29 (71.60) compared to lowest in age between 18-23 years (54.34). Regarding caste prevalence of anemia in both rural and urban areas was more in lower caste (i.e. 69.35 and 72 respectively). While it was lower in high category in rural (i.e. 61.53) and in middle category in urban (56.48). Education has no relationship with the infestation of anemia in both categories of respondents (fig.11).

Respondents living in nuclear family had showed low prevalence of anemia (54.16) to rural category, contrary to it respondents of joint families showed higher occurrence of anemia in urban group (60.49). Occurrence of anemia was least in respondents of medium size family in rural (64.35) while small in urban sized family (58.82). Prevalence of anemia was more in large family size of both group (rural 67.56 Vs urban 65.38). In rural group respondents

having other occupation than agriculture service, business and labor had minimum infestation of anemia (71.42) while service occupation respondents showed highest infestation of anemia (80). Urban respondents with business as occupation had least prevalence of anemia (52.77) compare to highest in other (71.79). Respondents with income group between Rs. 7000≤above were least chronic to anemia in both rural and urban (i.e.-40.8 & 51.85 respectively) Further the respondents with income ranging between Rs. 1000-3000 had highest infestation of anemia (79.38) in rural and the respondents with income group ranging between Rs. 5000-7000 had highest infestation of anemia (74.19) (fig.12).

Prevalence of anemia was found both in rural and urban in the age group of 24-29 years. The reason might be that they are not aware about the seriousness of anemia and they take it very casualty.

But the prevalence of anemia was found more in joint family in rural and more in nuclear family in urban. The reason that they do not get proper diet due to joint family while in urban due to nuclear family the pregnant women becomes lazy and ignore about recommended diet. Regarding the education of the respondents, prevalence of anemia in rural and urban was more in Junior high school. The

reason for such results in rural population might be that due to illiteracy they are not aware of the proper diet and daily to take the prescribed diet, while in urban areas they ignore due to laziness and were conscious about their looks and physique.

4.6 Association of socio-personal and economic factors of respondents with prevalence of anemia

This section constitutes the information related with the factors affecting the anemia. Section has been further sub divided into two subsections:

4.6.1 Association of socio personal factors with anemia.

4.6.2 Association of family factors with anemia.

4.6.1 Association of socio personal factors with anemia.

This subsection includes the information regarding on socio-personal factor of prevalence of anemia in urban and rural population by using $\chi 2$ computations.

TABLE-8

Association of socio personal variable and prevalence of anemia

S. No.	Variable	Degree of freedom	$\chi 2$ Calculated		$\chi 2$Tabulated (5%)
			Rural	Urban	
1	Age	2	0.10380	5.76292	5.99
2.	Caste	2	0.79435	3.13958	5.99
3.	Education	6	7.38945	2.506812	12.592

The results in table 8 indicates that association of age was found to be non significant with anemia of rural and urban respondents. Similar association was found in case of caste and education. Both caste and education were not associated with prevalence of anemia. They do not influence the prevalence of anemia both in rural and urban population.

Rawat et al (2001) reported that anemia was found to be significant associated with education status, that is contrary to our findings.

4.6.2. Association of family factors with anemia.

This subsection includes the information regarding association of family variables with prevalence of anemia calculated by using $\chi 2$ computations.

The results in table 9 indicates that only size of family was found to be non significant with prevalence of anemia of rural respondents.

TABLE-9

Association of family variables and prevalence of anemia

S.No.	Variable	Degree of freedom	$\chi 2$ Calculated		$\chi 2$ Tabulated (5%)
			Rural	Urban	
1	Type of family	1	6.1376	0.0877	3.841
2	Size of family	2	0.16230	0.61567	5.99
3	Monthly income	3	20.928	7.89721	7.815
4	Occupation	4	9.58071	15.4524	9.488

It is further evident that type of family was found to be significantly associated with prevalence of anemia ($\chi 2$ =6.1376). Monthly income and occupation of the family was also found to be significantly associated with prevalence of anemia ($\chi 2$= 20.928 and 9.58071 respectively). As in case of urban population, only occupation of the family was found to be significantly associated with prevalence of anemia (($\chi 2$=15.4524) . Rest of the components in family variables i.e type, size and monthly income of the family were found not to be not associated with prevalence of anemia.

TABLE-10

Association of nutrients intake and prevalence of anemia

S.No.	Variable	Degree of freedom	$\chi 2$ Calculated		$\chi 2$ Tabulated
			Rural	Urban	
1	Calorie	3	2.69894	9.6898	7.815
2	Protein	3	16.5105	6.0846	7.815
3	Iron	3	13.0213	31.5729	7.815
4	Calcium	3	19.9751	23.0279	7.815

4.7 Association of nutrients intake with prevalence of anemia

This sub section includes the information regarding association of nutrients and in rural and urban population calculated by using$\chi 2$ computations.

Perusal of Table 10 indicates that similar trend of association found in nutrients intake in both urban and rural population with prevalence of anemia is similar to family variables. In both type of population association of calorie was found to be non significant with prevalence of anemia.

In both rural and urban population protein is found to be significantly associated with prevalence of anemia (i.e-16.5105 and 6.0846 respectively). Similarly, intake of iron and calcium also has significant association with prevalence of anemia in both rural (13.0213 & 19.9751) and urban (31.57 & 23.13) population.

TABLE-11

Total prevalence of anemia in rural and urban areas

N=400

Category	Rural	Urban	Total	Rural	Urban	Chi-test value	*df*	Table value (P<0.05)	Coefficient of Contingency
	Observed Frequencies		--	Expected Frequencies					
Anemic	131	124	255	127.5	127.5	0.530088	1	3.84	0.036379
Non-anemic	69	76	145	72.5	72.5				
	200	200	400						

N = Total No. of respondents.

4.8 Total prevalence of anemia in rural and urban areas

Prevalence of anemia in rural and urban responds (n-200for each) is given in table(11) .Chi square test values (0.53009) indicates that association between occurrence of anemia and respondents is non significant .

Table-12 Total prevalence of anemia of rural and urban respondent based on socio-personal and economic profile (N=255)

Varaible	Category	Rural	Urban	Total	Rural	Urban	Chi-test value	*df*	Table value (P<0.05)	Coefficient of Contingency
		Observed Frequencies			Expected Frequencies					
Personal										
Age	18-23	59	50	109	55.99608	53.00392	1.03411	2	5.99	0.063553
	24-29	53	58	111	57.02353	53.97647				
	30-35	19	16	35	17.98039	17.01961				
	Total	131	124	255						
Caste	Lower	43	18	61	31.33725	29.66275	16.52951	2	5.99	0.24673
	Middle	64	61	125	64.21569	60.78431				
	High	24	45	69	35.44706	33.55294				
		131	124	255						
Education	Illiterate	38	6	44	22.60392	21.39608	56.14306	6	12.59	0.424784
	Just lit.	12	11	23	11.81569	11.18431				
	Primary	34	14	48	24.65882	23.34118				
	Jr Hsc	11	18	29	14.89804	14.10196				
	High Sc.	17	19	36	18.49412	17.50588				
	Inter	14	20	34	17.46667	16.53333				
	Graduate	5	36	41	21.06275	19.93725				
		131	124	255						

Type of family										
	Nuclear	39	75	114	58.56471	55.43529	24.30806	1	3.84	0.295008
	Joint	92	49	141	72.43529	68.56471				
		131	124	255						
Size of family	Small	41	50	91	46.74902	44.25098	139.1333	2	5.99	0.594147
	Medium	65	57	122	62.67451	59.32549				
	Large	25	17	213	109.4235	103.5765				
		131	124	255						
Occupation	Agri	52	32	84	46.82553	37.17447	78.16432	4	9.49	0.499595
	Service	11	19	30	16.7234	13.2766				
	Business	10	45	55	30.65957	24.34043				
	Labour	51	0	51	28.42979	22.57021				
	Other	7	8	15	8.361702	6.638298				
		131	104	235						
Monthly income	1000-3000	77	14	92	47.26275	44.73725	101.9478	3	7.81	0.534425
	3000-5000	21	22	45	23.11765	21.88235				
	5000-7000	13	46	137	70.38039	66.61961				
	7000 ≤	20	42	66	33.90588	32.09412				
		131	124	255						

4.9 Total prevalence of anemia rural and urban respondents based on socio-personal and economic profile

Relationship between the socio-economic traits of respondents (both rural and urban) and prevalence of anemia is presented in table(12). Values of chi-square test exhibits that a strong association exists between socio-economic variables (caste, education, type of family, size of family occupation and monthly income) and occurrence of anemia in the respondents. However the relationship between age of responds and occurrence of anemia was non significant (chi square value = 1.034). The chi square tests values observed for caste, education, type of family, size of family, occupation and monthly income were 16.529, 56.143, 24.308, 139.133, 78.164 and 101.947, respectively.

Table –13 Total Frequency distribution of daily intake of different nutrients of rural urban respondents

N=400

		Rural	Urban	Total	Rural	Urban	manual	df	Table value (P<0.05)	Coefficient of Contingency
		Observed Frequencies			Expected Frequencies		Chi-test value			
Calorie (Kcal)	1250-1550	38	29	67	34.41961	32.58039	9.480899	3	7.81	0.189334
	1550-1850	59	44	103	52.91373	50.08627				
	1850-2150	20	39	59	30.3098	28.6902				
	2150 ≤	14	12	26	13.35686	12.64314				
		131	124	255	131	124				
Protein (gm)	Below 40	80	33	113	58.05098	54.94902	36.08622	3		0.352095
	40 - 50	29	47	76	39.04314	36.95686				
	50 - 60	18	28	46	23.63137	16.38178				
	60 ≤	4	16	20	10.27451	18.31964				
		131	124	255	131	126.6073				
Iron (mg)	Below 10	30	17	47	23.87302	23.12698	57.25601	3		0.43028
	10 - 20	92	50	142	72.12698	69.87302				
	20 - 30	5	48	53	26.92063	26.07937				
	30 ≤	1	9	10	5.079365	4.920635				
		128	124	252	128	124				
Calcium (mg)	200-400	56	32	88	45.20784	42.79216	10.76265	3		0.201239
	400-600	43	41	84	43.15294	40.84706				
	600-800	23	37	60	30.82353	29.17647				
	800- ≤	9	14	23	11.81569	11.18431				
		131	124	255	131	124				

4.10 Total Frequency distribution of daily intake of different nutrients of rural and urban respondents

Results observed on intake level of different nutrients and its relation with prevalence of anemia in both type of respondents (rural and urban) is given in table (13). Statistical analysis of results exhibited that intake level of nutrients has significant co-relation/association with prevalence of anemia. The chi square values observed for calorie, protein, iron and calcium were 9.480, 36.086, 57.256 and 10.762, respectively.

4.11 Suggestion for suitable/ appropriate remedies for controlling pregnancy anemia.

Iron deficiency occurs in 20 % pregnant women in developed countries. Even worse, 50% or more of women in non industrialized nations become iron deficient and between 30% and 50% are deficient in folic acid. Severe anemia is associated with a higher mortality rate among pregnant women. Mild to moderate anemia, however, does not pose any elevated risk

Pregnancy increase the risk for anemia in different ways:-

Pregnancy increases the body's demand for folic for folic acid and therefore poses a risk for deficiencies and an increased risk for megaloblastie anemia. Low levels of folate during pregnancy increase the risk of neural tube defects in newborns. Pregnancy also increases

the demand for iron, thus posing a risk for iron deficiency anemia. Pregnancy is also associated with fluid retention, which in turn may produce high volumes of plasma. This can dilute red blood cell, which may lead to anemia. After delivery, heavy bleeding, who occurs in 5% to 10% of women who have given birth, can cause symptoms of anemia. Good maternal nutrition is important for the health and reproductive performance of women and the health, survival, and development of their children-Suggested for some remedies of anemia in pregnancy:-

a. Eat more foods that are good source of iron.

b. Concentrate on green leady vegetables, lean, red meat, beef liver, poultry, fish, wheat germ, oysters, dried fruit and iron fortified cereals.

c. Boost your iron absorption.

d. Food high in vitamin C- like citrus fruits, tomatoes and strawberries, one orange or six ounces of orange juice food can double the amount of iron your body absorb from plant

e. Eat good food sources of folic acid daily-

i. These include vegetables like asparagus, brussels sprouts, spinach, romaine lettuce, collard green and broccoli.

ii. Black – eyed peas, cantaloupe, orange juice oatmeal, whole grain cereals, wheat germ, liver and other organ meats are excellent source also.

iii. Eat fresh, uncooked fruits and vegetables often, don't over cook food. Heat destroys folic acid.

Dietary Recommendations for Preventing Anemia:-

Forms of Iron:- Iron found in foods is either in the form of heme or non-heme iron –foods containing heme iron are the best for increasing or maintaining healthy iron levels. Such foods include clams, oysters, organ meats, beef, Pork, poultry, and fish.

Non-heme iron is less well absorbed. About 60% of iron in meat in non-heme. Eggs, dairy products, and iron- containing vegetables only have the non-heme form.

Chapter - 5

Summary & Conclusion

SUMMARY AND CONCLUSION

Nutritional anemia may be defined as the condition that results from the inability of the erythropoietic tissue to maintain a normal haemoglobin concentration on account of inadequate supply of one or more nutrients leading to reduction in the total circulating haemoglobin. Nutritional anemia is caused by the absence of any dietary essential nutrient that is involved in haemoglobin formation or by poor absorption of these dietary essentials. Recent World Health Organization (WHO) statistics indicate a world wide anemia prevalence of about 30% with higher rates in developing countries. Anemia is also prevalent in non-pregnant women (35%) and among adult males (18 percent). In Asia 65 percent of the pregnant women are anemic compared to 14 percent in Europe. In India its incidence varies from 80 percent in Hyderabad and 45 percent in Madras. 85 percent of pre school children have Anemia (Nutrition on News 1982 National Institute of Nutrition Hyderabad). In 1998 the World Health Organization reported a prevalence of anemia within the children and pregnant women about 50% in the developing countries, making it one of the important public health problems.

Objective :

1. To find out the extent of pregnancy anemic prevalence in rural vis-a vis urban population.
2. To investigate the socio personal, socio economic and dietary factors associated with prevalence of anemia.
3. To suggest the suitable/ appropriate remedies for controlling pregnancy Anemia.

Methodology

Locale of study:- Bundelkhand region was selected purposively as the locale of the study.

Sampling procedure :-

Selection of site :- Jhansi district of Bundelkhand region was selected and from this state , seven block prepared. From these districts, seven blocks were selected randomly. These seven blocks were Chirgaon, Gursaria, Moth, Bamor, Badagaon, Babina, Mauranipur, and from these seven blocks, primary health centre and maternity hospital from both rural and urban areas were selected respectively.

Selection of Respondents: - The list of pregnant women from 7 blocks was prepared. These pregnant women were divided into two categories of rural and urban areas, 200 pregnant women each from

rural and urban areas were selected. Thus, 400 respondents from Jhansi district were selected for the study.

Development & Pretesting of Questionnaire: - A well-structured questionnaire related to socio economics status and 24-dietary recall was prepared.

Variable and their measurements:-

Dependent variables: Prevalence of anemia in pregnant women was taken as dependent variable

Independent variable- Age, education of respondents, total income of the family ,Occupation of the family head respondents family , Caste , Family type and Size of family .

Data Collection

Haemoglobin Estimation: - was carried out at the spot by standard shell's method *(Hunter and Buford,* (1958). Results were expressed in gm/100 dl.

Information on the family composition, their dietary habit and intake of food articles, in last 24 hours, by the respondents were recorded. Nutrients intake was worked- out in terms of energy, protein, calcium, iron, with the help of the tables, designed by Indian Council of Medical Research for the purpose.

Follow-up of Pregnant Women: - Follow-up examination, of the study selected women who have been registered in first and second trimesters of their pregnancy, was carried-out during second and third trimesters respectively at an average interval of about 3 months.

Nutritional status: Nutrient intake of the subjects was determined by weightment and actual analysis of composite diets.

Nutrients intake: A structured interview schedule was developed and pretested before use. Data were collected by paying personal visits to the respondents. Information regarding the intake of food for three consecutive days was collected from respondents using measures including katories, spoons and glasses of standard sizes, shown to the respondents and used in order to estimate the amount of raw ingredients used and cooked food consumed. Food intake was recorded in terms of grams and milliliters. Nutrients namely, energy, protein, fact and calcium were measured.

Statistical Analysis: - Appropriate statistical tools and test were applied to draw inferences.

Frequency and percentage:- Frequency and percentage were obtained to know the distribution of both dependent and independent variables of the study.

Chi –square test:- Chi –square test was applied to establish the association between dependent and independent variables. Chi – square was computed by the application of the formula.

$$\chi 2 = \Sigma \frac{(f-F)}{F}$$

where, f is the observed frequency
F is the expected frequency

Profile of the respondents of rural population:-

Majority of rural responds were in the age group of 18-23 years belong to middle caste and were educated up to primary standard. Mostly rural respondents were from joint and medium size families having agriculture as major occupation and having monthly income between Rs. 1000-3000.

Profile of the respondents of urban population:-

Majority of urban respondents were in the age of 18-23 years belong to middle caste and were educated up to graduation and above. Mostly urban respondents were from nuclear and medium

size families having service as main occupation and having monthly income more than Rs. 7000.

Distribution of extent of anemia in population of Bundelkhand Region:-

Majority of the respondents were anemic in rural (66%) and urban (62%) population

Distribution of severity of anemic in all three trimester in both rural and urban population:-

Moderate anemia was more prevalent during Ist trimester in rural women, while it was more during IIIrd trimester in urban women. Mild anemia was more prevalent during IInd trimester (%) in rural women while it was more during Ist trimester (%) in urban but severe anemia was more prevalent during IIIrd trimester (%)in rural women while it was more during IInd trimester (%) in urban.

Daily intake of different nutrients of rural respondents

Occurrence (%) of anemia decreased in respondents with the increasing dose / level of protein, and calcium while initial level of showed iron and calorie inconsistent effect of anemia. Rest of the levels of calorie and iron shows the. Decreasing trends of anemia in respondents with increasing does or level.

Daily intake of different nutrients of urban respondents

Occurrence percentage of anemia decrease with respondents in the increasing dose or level of calorie & protein except in one level of calorie. Similarly occurrence (%) of anemia decrease with respondents in the increasing dose or level of iron and calcium except in one level of iron.

Prevalence of anemia in rural and urban respondents based on socio-personal and economic profile

Prevalence of anemia was found both in rural and urban in the age group of 24-29 years.

The prevalence of anemia was found more in joint family in rural and more in nuclear family in urban. Regarding the education of the respondents, prevalence of anemia in rural and urban was more in Junior high school.

Association between age, caste and education

Association of age was found to be non significant with anemia of rural and urban respondents. Similarly association was found in case of caste and education. Both caste and education were not associated with prevalence of anemia.

Association of family factors with anemia.

Size of family was found to be non significant associated with prevalence of anemia of rural respondents. Type of family was found

to be significantly associated with prevalence of anemia. Monthly income and occupation of the family was also found to be significantly associated with prevalence of anemia .As in case of urban population, only occupation of the family was found to be significantly associated with prevalence of anemia. Rest of the components in family variables i.e type, size and monthly income of the family were found not to be not associated with prevalence of anemia.

Association of nutrients intake with prevalence of anemia

Similarly trend of association was found between in nutrients intake in both urban and rural population and prevalence of anemia was similar to family variable. In both type of population association of calorie was found to be non significant with prevalence of anemia. In both rural and urban population protein is found to be significantly associated with prevalence of anemia Similarly, intake of iron and calcium also has significant association with prevalence of anemia in both population.

Total prevalence of anemia in rural and urban areas

Association between occurrence of anemia and respondents is non significant .

Total prevalence of anemia of rural and urban respondents based on socio-personal and economic profile

A strong association exists between socio-economic variables (caste, education, type of family, size of family occupation and monthly income) and occurrence of anemia in the respondents. However the relationship between age of responds and occurrence of anemia was non significant

Total Frequency distribution of daily intake of different nutrients of rural urban respondents

Intake level of nutrients has significant co-relation/association with prevalence of anemia.

Suggestion for suitable/ appropriate remedies for controlling pregnancy anemia.

Suggestion for some remedies of anemia in pregnancy:-

- Eat more foods that are good source of iron.
- Concentrate on green leady vegetables, lean, red meat, beef liver, poultry, fish, wheat germ, oysters, dried fruit and iron fortified cereals.
    - Boost your iron absorption.
- Food high in vitamin C- like citrus fruits, tomatoes and strawberries, one orange or six ounces of orange juice food can double the amount of iron your body absorb from plant

❖ Eat good food sources of folic acid daily-

- These include vegetables like asparagus, Brussels sprouts, spinach, romaine lettuce, collard green and broccoli.
- Black – eyed peas, cantaloupe, orange juice oatmeal, whole grain cereals, wheat germ, liver and other organ meats are excellent source also.
- Eat fresh, uncooked fruits and vegetables often, don't over cook food. Heat destroys folic acid.

Dietary Recommendations for Preventing Anemia:-

- Forms of Iron:- Iron found in foods is either in the form of heme or non-heme iron –foods containing heme iron are the best for increasing or maintaining healthy iron levels. Such foods include clams, oysters, organ meats, beef, Pork, poultry, and fish.
- Non-heme iron is less well absorbed. About 60% of iron in meat in non-heme. Eggs, dairy products, and iron- containing vegetables only have the non-heme form.

Bibliography

BIBLIOGRAPHY

Abel, R. Rajaratham, J. Gnanasekaran, V .J. Jayaraman, P. 2001. Prevalence of Anemia and iron deficiency in three trimesters in Rural Vellore district, South India. Top Doct 31(2): 86-9

Agarwal, A .K. Sen, A .K. Katra, N .K. Gupta, N. 1999. Prevalence of Anemia during pregnancy in district Burdwan, west Bengal. Indian J public Health. 43 (1): 26-31

Andersen, L.T. Thilsted, S .H. Nielsen, B .B. Rangasamy, S. 2003. Food and nutrient intake among pregnant women in rural Tamil Nadu, South India. Public Health Nutr. 6 (2): 131-7

Anonymus, 1997. Effect of Iron supplement on the from status of pregnant women consequence for new born. American Journal of clinical Nutrition Vo/.66 (5) .Pg 1178

Arturo, M.C.I. Guiomar, P.M. Gabriela, C. Sergio, M. 2002.Prevalence of anemia during pregnancy: Results of Valencia (Venezuela) anemia during pregnancy study. ALAN Vol. 52 No. 1 Caracas

Bentley, M .E. Griffiths, P. L. 2003. The Burden of anemia among women in India Eur J clin Nutr. 57 (1): 52-60

Brevmann, C. 2001.Current aspects of diagnosis and therapy of iron deficiency anemia in pregnancy Schweiz Rundsch Med Prax. 2: 90 (31-32): 1283-91.

Diez-Ewald, M. 2002.Nutritional anemia of pregnancy in the Zulia states. Invest Clin- 43(4): 229-30.

Fujimori, E. Oliveira, I .M .V. Nunezde, C. L.M. Szarfarc, S. C.1999. Estado Nutrition del hierro de g estantes adolescents, Sao Paulo, Brasil; Arch Lotinoamer Nutr. 49:8-12

Gopaldas, T. 2002. Iron deficiency anemia in young working women can be reduced by increasing the consumption of cereal bond fermented food or gooseberry juice at the workplace. Food Nutr. Bull. 23(1): 94-105

Hulter, I. 1996. Reduction of food intake during pregnancy in rural south India Trop Med Int Health. 1 (3): 399-405

Jood, S.Bishnoi, S.Khetarpaul, N. 2002. Nutritional status of rural pregnant women of Haryana State, Northern India. Nutr Health. 16 (2): 121-31

Jose O Mora, Penelope S Nestel (2000). Improving prenatal nutrition in developing countries : Strategies, prospects and challenges. Am J. Clin Nutr. 71 : 1353 - 63.

Oiong X. Buekens, P. Fraser, W.D. Gou, Z.2003. Anemia during pregnancy in a Chinese population. Int J Gynaecol Obstet. 83 (2): 159-64.

Panwar B, Punia D (1998). Nutrient intake of rural pregnant women of Haryana state, northen India: relationship between income and education. Int J Food Science Nutrition 1998 sp;49 (5): 391-5

Panwar, B. Punia, D. 1998. Food intake of rural pregnant women of Haryana state, northern India: relationship with education and income. Int J Food Science Nutr. 49 (3): 243-7

Pathak, P. Singh, P. Kapil, V. Raghuvanshi, R.S. 2003. Prevalence of iron, vitamin A, and iodine deficiencies amongst adolescent pregnant mother. Indian J Pediatr. 70 (4): 299-301

Prezioai, P. Prual, A. Galan,P. Daounda, H. Bouremia, H. and S. hercberg. 1997. Effect of Iron supplement on the iron status of pregnant women; consequence for new born. American journal of clinical Nutrition. Vol. 66 No 5.P. 1178.

Rajartnam, J. Abel, R. Asokam, J .S. and Jonathan, P. 2000. Prevalence of anemia among adolescent girl of rural Tamilnadu. Indian pediatr. 37(5): 532-6

Ratnville, A.J.1998. Pica practices of pregnant woman are associated with lower maternal hemoglobin level at delivery. Journal of the American Dietetic Association. vol. 98, NO. 3, p. 293

Rawat, Garg, C .M . Singh, S.K. 2001 Prevalence of anemia among adolescent girls rural area of district meerul. Indian J public health. 45(1): 24-6

Ray, S .K. Mallick, S. kumar, S. Biswas, B.2000. A rapid assessment of Anemia in pregnant in west Bengal with special reference to care seeking behaviour of mothers. Indian J Public Health. 44(2): 58-64

Reviewed by: Harvey Simon, MD, Editor -in –Chief, Associate Professor of Medicine, Harvard Medical School; Physician, Massachusettts General Hospital.

Scholl, T.O. 1998.High third-trimester Ferritin concentration: associations with very preterm delivery, infection, and maternal nutritional status. Obstet Gynecol. 92: 161-66

Sharma, J .B. Soni, D. Murthy, N. S.Malhotra, M. 2003. Effect of dietary habits on prevalence of anemia in pregnant women in Delhi. J obstet Gynaecol Res. 29 (2): 73-8.

Wahab, S.N. Sakode, A.M.1994. Dietary pattern of pregnant women attending U.H.C. Nagpur. The Indian Journal of Nutrition and Dietetics. 31(6). P. 177-180

Annexure -I

Annexure-1

INTERVIEW SCHEDULE

Urban/ Rural

GENERAL INFORMATION

1- Name :

2- Age :

3- Address :

4- Education : Illiterate/Just literate/Primary / Junior High School / HighSchool / Inter/ Graduate and above

5- Height :

6- Weight :

7- Occupation: Agriculture/ Business/Service/ Labor/Other

8- Type of family : Joint/Nuclear

9- Number of family members : Small (upto5) Medium (5to10) Large (above10)

10. Monthly income

11. How much money do you spend on family food per month?

12. Age at marriage

13. Age at first delivery.

14. Estimated weeks of pregnancy

15. Present pregnancy 1/2/3/4/5

16. History of last pregnancy

17. Pregnancy duration- 1/2/3/ more than 3

18- Haemoglobin level

Hb level	Ist Trimester	IInd	IIIrd
Gm/dl Blood			

19- Complication for illness if any

	Previous	1st times	2nd times	3rd times
	Pregnancy			
	Nausea			
	Toxemia			
	Vomiting			
	Anemia			
	Long term illness			
	Any other			

Dietary History:

Food Habits:

I- Diet- Veg./Non Veg./egg Veg.

II- Staple food

III- Any food taboos imposed.

What foods do you specially take or avoid during pregnancy ?

Are there my any food combination you avoid?

Has doctor told you to avoid any food?

Does the family suggest about your food during this period?

Yes/No

If yes, who suggests?.....

Ma' in law/Mother/Yourself/any other member/friends.

EATING PATTERN:

1. Likes and Dislikes .....
2. Whether more consumption of fried food / spicy boiled or baked .
3. Supplements being taken tonics, medicines welfare foods etc.
4. Do you have the desire of eating other things like chalk, charcoal, betea leaves nuts etc.

   If yes, what?.....
5. If you were to plan your own diet would your make any change?

   Yes/No

   What?.....

SCHEDULE FOR ASSESSING FOOD INTAKE :

(a) No of meals per day.....

(b) No of snacks in between .....

QUESTIONNAIRE 24 HOURS RECALL

Meal	Item	Number	Gram / Qty.
Breakfast:	Chapati Parantha Bread Rice Dal Vegetables Milk Tea Sugar Fruit Other		
Mid Morning			
Lunch	Chapati Parantha Rice Dal Vegetables Curd Fruit Salad Other		

Evening Tea			
Dinner	Chapati Parantha Rice Dal Vegetables Curd Fruit Salad Other		